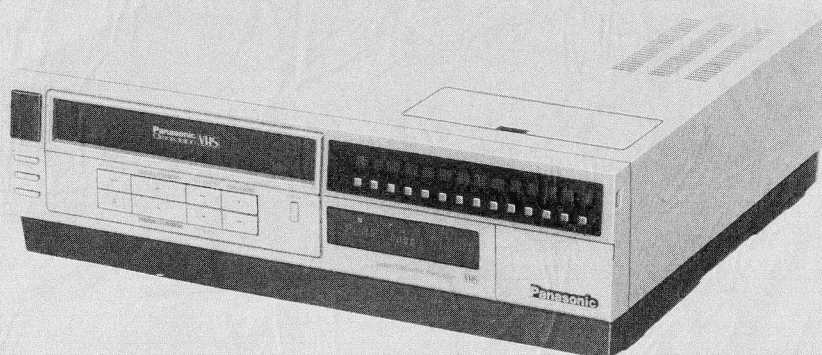


Service Manual

Video Cassette Recorder

Panasonic
Omnivision **VHS**
PV-1520

Vol. 1

*Summary
Technical
Descriptions*

Vol. 2

*Mechanical
Adjustment
Procedures
Electrical
Adjustment
Procedures*

Vol. 3

Block Diagrams

Vol. 4

*Schematic
Diagrams
Printed Circuit
Board Diagrams*

Vol. 5

*Exploded Views
Replacement
Parts List*

VHS
Panasonic®

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Service Manual

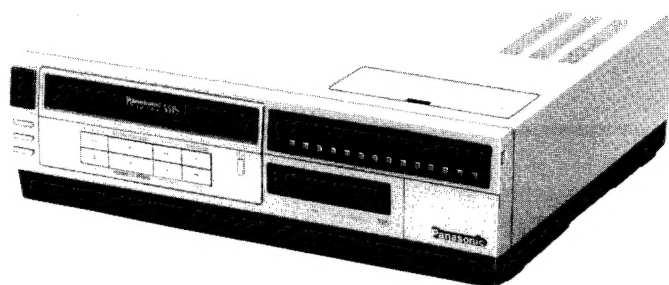
Video Cassette Recorder

Vol. 1
Panasonic
Omnivision VHS
PV-1520

Summary

Operating Instructions

Technical Descriptions



SPECIFICATIONS

Power Source: 120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
 Power Consumption: Approx. 24 watts (When the Power switch is OFF, Approx. 11 watts)
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording
 System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track
 Tape Format: Tape width 1/2" (12.7mm), high density tape
 Tape Speed: SP mode: 1-5/16 i.p.s. (33.35 mm/s)
 LP mode: 21/32 i.p.s. (16.67 mm/s)
 SLP mode: 7/16 i.p.s. (11.12 mm/s)
 Record/Playback Time: 8 HRS. with 160 min. type tape used in SLP mode
 FF/REW Time: Less than 6 min. with 120 min. type tape
 Heads: Video: 4 rotary heads
 Audio/Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: AUDIO IN Jack (RCA type)
 -20 dB, 50 k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch13,
 Cable Channels "A"—"W"
 75 Ω unbalanced
 UHF Input: Ch14-Ch83,
 300 Ω balanced

Output Level: Video: VIDEO OUT Jack (RCA type)
 1.0 Vp-p, 75 Ω unbalanced
 Audio: AUDIO OUT Jack (RCA type)
 -6 dB, 600 Ω unbalanced

RF Modulated: Ch3/Ch4 switchable,
 72 dB μ , (Open Voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 230 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
 (10 dB down) LP mode: 100 Hz ~ 6 kHz
 SLP mode: 100 Hz ~ 5 kHz

Signal-to-Noise Ratio: Video: SP mode: better than 43 dB
 LP mode: better than 41 dB
 SLP mode: better than 41 dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42 dB
 LP mode: better than 40 dB
 SLP mode: better than 40 dB

Operating

Temperature: 41°F—104°F (5°C—40°C)
 Operating Humidity: 10%—75%
 Weight: 20.1 lbs. (9.1 kg)
 Dimensions: 16-15/16" (W) \times 14-5/16" (D) \times 5-1/8" (H)
 (430 mm \times 364 mm \times 130 mm)

Accessories Supplied:

- Wireless remote control unit
- VHF matching box 75 Ω —300 Ω transformer
- 300 Ω —75 Ω transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable
- Video cassette tape, NV-T60

Available Tapes:

1/2" VHS video cassette tapes
 NV-T160 Approx. 1073 ft. (327 mm), 160, 320, or 480 min.
 NV-T120 Approx. 810 ft. (247 mm), 120, 240, or 360 min.
 NV-T60 Approx. 417 ft. (127 m), 60, 120, or 180 min.

Weight and dimensions shown are approximate. Designs and specifications are subject to change without notice.

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INTRODUCTION

This Service Manual contains information which will allow the service technician to understand and service the Panasonic VHS Recorder Model PV-1520 and the various accessories that compliment the deck.

For a detailed technical explanation, please refer to the Training Manual this model.

Some of the Features incorporated in this model are: the new Tech-4 design which incorporates 4 video heads and new circuitry to provide improved Search operation and perfect STILL Picture in the SP and SLP modes, Front load design, soft touch controls, cable ready, 12 position Electronic Tuner, 2 week/2 program Timer, Wireless Remote Control, One Touch Record Button (OTR), Light Editing, and Auto Rewind.

The PV-1520 also uses a new multi function display indicator.

This display tube combines indicators for time, tape counter, speed, transport functions, and timer record into one easy to read digital display.

The above features plus the VHS format make the PV-1520 table top VCR an excellent unit for your enjoyment.

Just slightly ahead of our time.....Panasonic.

CONTENTS

SPECIFICATIONS	Cover
SAFETY PRECAUTIONS.....	1-1
FEATURES	1-1
CONTROLS & COMPONENTS	1-2
VHS PRINCIPLE OF OPERATION	1-4
Basic Video Tape Recording	1-4
1. Video Head	1-6
2. Azimuth Recording	1-7
3. VHS Color Recording System	1-8
GLOSSARY OF TERMS	1-10

SAFETY PRECAUTIONS

GENERAL GUIDELINES

- 1. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
- 2. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shileds are properly installed.
- 3. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

LEAKAGE CURRENT COLD CHECK

- 1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
- 2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1MΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be ∞.

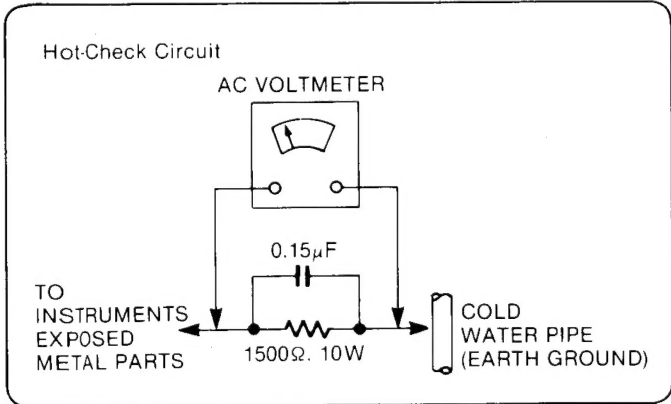



Figure 1


LEAKAGE CURRENT HOT CHECK (See figure 1.)

- 1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
- 2. Connect a 1.5kΩ, 10 watts resistor, in parallel with a 0.15μF capacitor, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in figure 1.
- 3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
- 4. Check each exposed metallic part, and measure the voltage at each point.
- 5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
- 6. The potential at any point should not exceed 0.75 volts RMS. A leakage current tester (Simpson Model 229 equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 milliamp. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.



FEATURES

- Eight-hour recording
- Watch one channel while recording another
- Multi-motion playback
 - Search
 - Field-Still
 - Frame Advance
 - Slow
- Unattended Recording (Timer Recording)
- Cable-ready
- One Touch Recording
- Front Loading
- Fine-editing function
- Wireless Remote Control

**CAUTION**
RISK OF ELECTRIC SHOCK
DO NOT OPEN



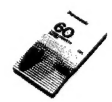
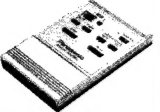




CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.

This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

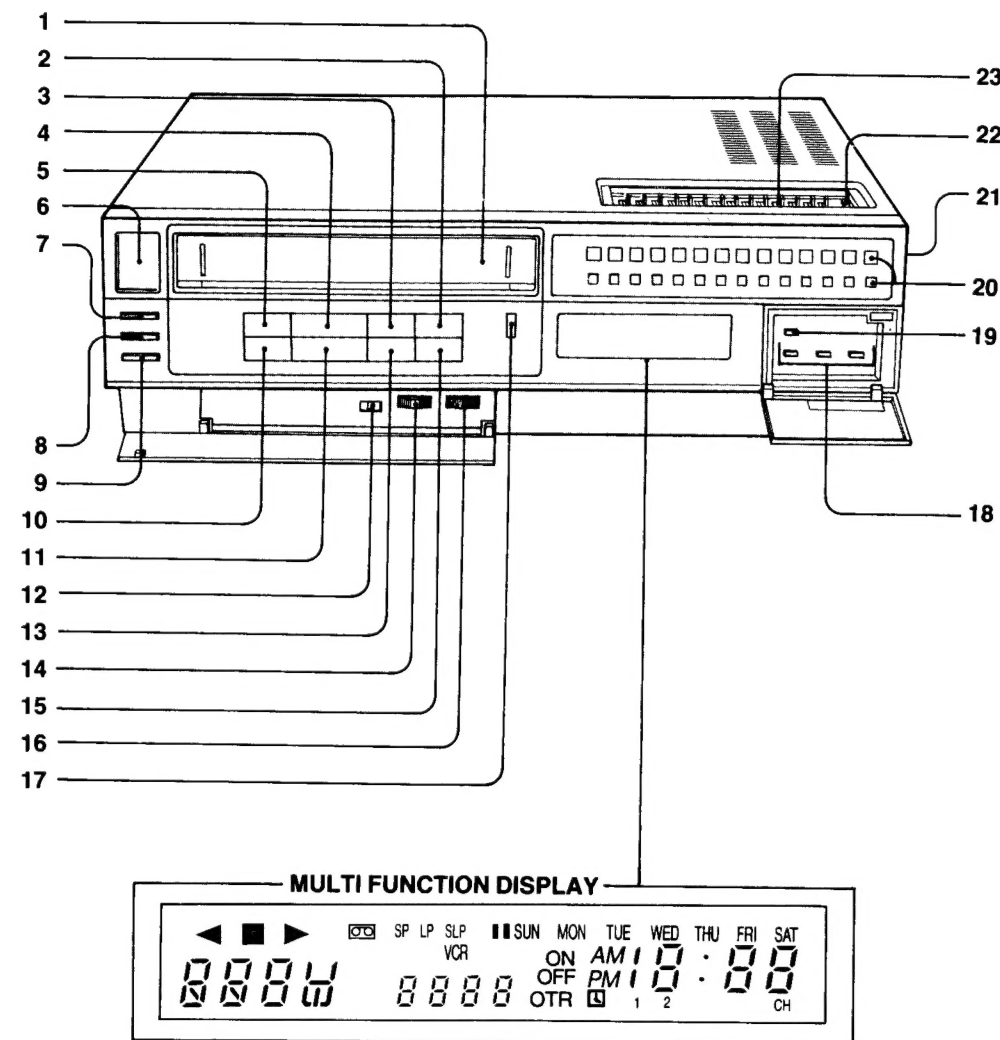
ACCESSORIES SUPPLIED

1 pc. Cassette Tape (NV-T60) 	1 pc. Wireless Remote Control 	1 pc. Coaxial Cable with One-Touch type F connector 
1 pc. Twin-Lead Cable 	1 pc. VHF Matching box 75 ohm – 300 ohm Transformer 	1 pc. 300 ohm – 75 ohm Transformer 

CONTROLS AND COMPONENTS

PV-1520

TOP and FRONT



MULTI FUNCTION DISPLAY

- **DIGITAL CLOCK**
Normally, the present time is displayed.
- **TAPE COUNTER**
Tape counter number is displayed.
- **SPEED INDICATOR "SP" "LP" "SLP"**
This shows the tape speed during recording and playback.
- **VCR/TV INDICATOR "VCR"**
This indicator appears when the VCR/TV Selector is set to VCR.
- **FUNCTION INDICATOR "EJECT" "PLAY" "REC" "REW" "FF" "PAUSE" "STILL" "SEARCH" "STOP" "FRAME ADVANCE"**
This shows the mode of VCR (EJECT, PLAY, REC, REW, FF, PAUSE, STILL, SEARCH, STOP, FRAME ADVANCE).

- **DEW INDICATOR "DEW"**
This indicator appears if excessive moisture condenses in the unit. If the DEW Indicator is ON, the unit will not operate. If this happens, leave the VCR ON and let it remain at room temperature until this indicator goes off.
- **TIMER INDICATOR "ON" "OFF" "OTR"**
When TIMER Button is set to ON, this indicator appears and you will not be able to operate the unit manually.
- **PROGRAM NUMBER "1" or "2"**
This shows the program number for Timer Recording.
- **O.T.R. INDICATOR "OTR"**
When OTR is set, this indicator appears.
- **CASSETTE-IN INDICATOR "CIN"**
This indicator shows the condition of the cassette tape in the unit.

1. CASSETTE COMPARTMENT

Slide the cassette into the unit until the mechanism draws it in automatically. When a cassette is already installed a mechanical stop is present. Therefore, do not force a cassette into this compartment.

2. RECORD BUTTON

Recording is started by pushing this button and the PLAY Button at the same time. "REC" and "▶" appear on the Multi Function Display.

3. FAST FORWARD/SEARCH (FF) BUTTON

Push this button to move the tape forward rapidly. "FF" and "▶" appear on the Multi Function Display. During the playback mode, holding this button down will allow you to view the picture in the forward direction rapidly. "▶" flashes.

4. PLAY BUTTON

Push this button to play back recorded tapes. "PLAY" and "▶" appear on the Multi Function Display.

5. REWIND/SEARCH (REW) BUTTON

Push this button to rewind tapes. "REW" and "◀" appear on the Multi Function Display. During the playback mode, holding this button down will allow you to view the picture in reverse rapidly. "◀" flashes.

6. IR REMOTE SENSOR

Receives signal from Wireless Remote Control.

7. POWER BUTTON

This button is used to turn the VCR on and off. When this button is pushed, counter appears on the Multi Function Display.

8. TIMER BUTTON

This button is used for Unattended Recording after programming functions have been completed. When this button is ON, "ON" appears on the Multi Function Display, and you will not be able to operate the unit manually.

9. VCR/TV SELECTOR

VCR: To monitor video recordings or to view playback.

TV: To watch TV or to view another program while recording a different program.

When this is set to VCR, "VCR" appears on the Multi Function Display.

10. EJECT BUTTON

Push this button to remove the cassette. "EJECT" flashes on the Multi Function Display while the tape is being ejected.

11. STOP BUTTON

Push this button to stop the tape. "STOP" appears on the Multi Function Display.

12. TAPE-SPEED SELECTOR (SP/LP/SLP)

Set this selector depending upon the length of the program to be recorded.

13. PAUSE/STILL BUTTON

Push this button to temporarily stop the tape movement in either the recording or playback mode. During playback, a still picture is produced when the pause is used. Push again to release pause. When this button is pushed, "PAUSE" and "■" appear on the Multi Function Display.

14. TRACKING CONTROL

Use this control during playback if the image is partially obscured by bands of noise. See page 17 for details.

15. FRAME ADVANCE BUTTON

While viewing a still picture, push this button to advance the picture one frame at a time or hold it down for a slow-motion picture. When this button is pushed, "PLAY" and "■" appear and "▶" flashes on the Multi Function Display.

16. PICTURE CONTROL

Use this control to make the picture softer or sharper.

17. RESET BUTTON

By beginning the recording at "0000", subsequent playback will be more convenient. Pushing this button causes the Tape Counter to return to "0000".

18. TIMER CONTROLS

Use this Timer to make an Unattended Recording when you are away from home, busy or asleep.

19. ONE TOUCH RECORD (O.T.R.) BUTTON (INNER DOOR)

One Touch Recording enables you to do impromptu recordings at any time. Just select the channel and push the ONE TOUCH RECORD Button for 30 minutes to 2 hours of recording.

20. CHANNEL SELECTOR BUTTONS/INDICATOR LIGHTS

Select the channel (2-83, A-W) you wish to view or record by pushing any one of these 14 buttons.

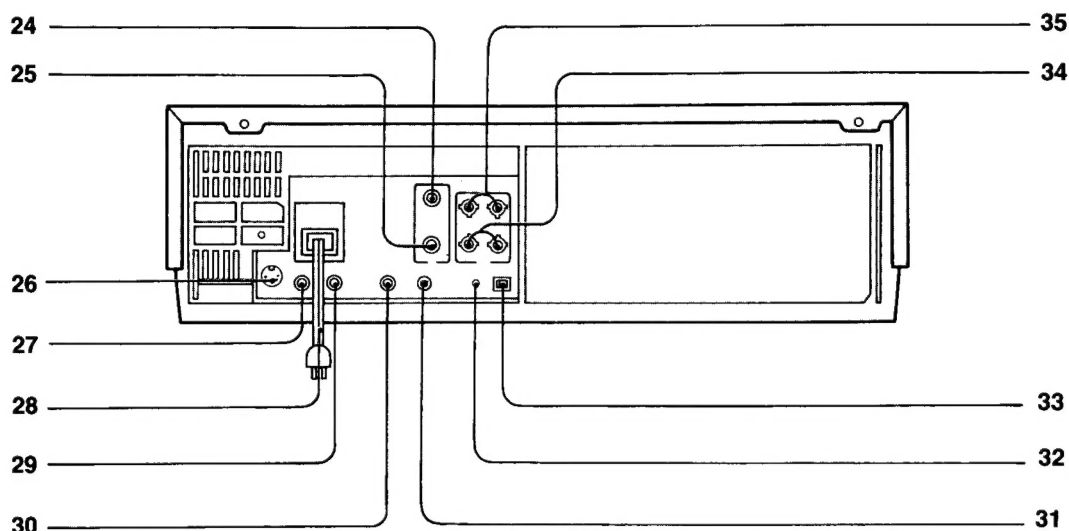
21. CHANNEL NUMBER HOLDER

Pull it out for changing channel tabs.

22. AUTOMATIC FINE TUNING (AFT) SWITCH (INNER DOOR)

Under normal conditions, turn the AFT Switch "ON".

23. UHF/VHF/CATV TUNING CONTROLS (INNER DOOR)

REAR**24. VHF ANTENNA OUTPUT TERMINAL (TO TV SET)**

Connect this terminal to the VHF antenna terminal on the TV.

25. VHF ANTENNA INPUT TERMINAL (FROM ANTENNA)

Connect the VHF antenna to this terminal.

26. AUXILIARY CONNECTOR

Connect the VCR Remote Control Cord of the CATV Adaptor/PV-CT2 (optional) to this connector. Using the CATV Adaptor and the Cable Descrambler Box, all functions (e.g. Timer Recording, Recording one channel while watching another) can be automatically operable for both regular TV programs and one pay TV program. Refer to the Operating Instructions of PV-CT2.

27. VIDEO OUTPUT CONNECTOR

For connection to a monitor TV or another VCR.

28. AC POWER CORD

Connect to a 120 V 60 Hz AC outlet.

29. AUDIO OUTPUT CONNECTOR

For connection to a monitor TV, another VCR or an audio tape recorder.

30. VIDEO INPUT CONNECTOR

For connection to another VCR or a portable video camera.

31. AUDIO INPUT CONNECTOR

For connection to a portable video camera or another VCR.

32. CAMERA REMOTE JACK

For connection to the Remote Pause Jack of the optional camera.

33. RF CONVERTER CHANNEL SELECTOR

Set to channel 3 or 4, whichever is not used in your area.

34. UHF ANTENNA INPUT TERMINALS (FROM ANTENNA)

Connect the UHF antenna to these terminals.

35. UHF ANTENNA OUTPUT TERMINALS (TO TV SET)

Connect these terminals to the UHF antenna terminals on the TV.

In some cases, the product may differ slightly from illustrations or photographs. Please be assured that this difference is not due to mistake but to ongoing product improvement.

VHS-PRINCIPLE OF OPERATION

Basic Video Tape Recording

To understand the VHS format, it is wise to first review the basic principles of video tape recording.

Like audio tape recording, video information is stored on magnetic tape by means of a small electromagnet, or head. The two poles of the head are brought very close together but they do not touch. This creates magnetic flux to extend across the separation (gap), as shown: Fig. 1.

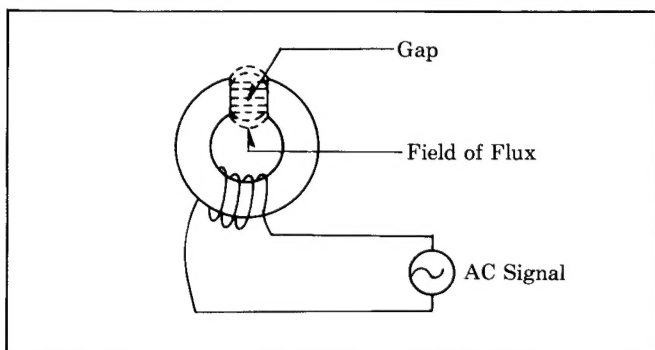


Fig. 1.

If an AC signal is applied to the coil of the head, the field of flux will expand and collapse according to the rise and fall of the AC signal. When the AC signal reverses polarity, the field of flux will be oriented in the opposite direction and will also expand and collapse. This changing field of flux is what accomplishes the magnetic recording. If this flux is brought near a magnetic material, it will become magnetized according to the intensity and orientation of the field of flux. The magnetic material used is oxide coated (magnetic) tape. Using audio tape recording as an example, if the tape is not moved across the head, just one spot on the tape will be magnetized and will be continually re-magnetized. If the tape is moved across the tape, specific areas of the tape will be magnetized according to the field of flux at any specific moment. A length of recorded tape will therefore have on it areas of magnetization representing the direction and intensity of the field of flux. For instance:

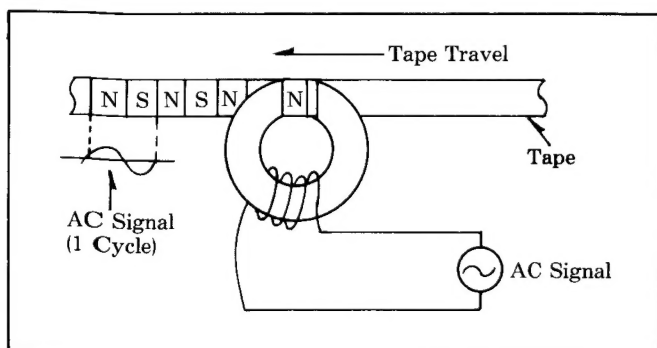


Fig. 2.

The tape will have differently magnetized regions, which can be called North (N) and South (S), according to the AC signal. When the polarity of the AC signal changes, so does the direction of magnetization on the tape, as shown by one cycle on the AC signal (see Fig. 2). If the recorded tape is then moved past a head whose coil is connected to an amplifier, the regions of magnetization on the tape will set up flux across the head gap which will in turn induce a voltage in the coil to be amplified. The output of the amplifier, then is the same as the original AC signal. This is essentially what is done in audio recording, with other methods for improvement like bias and equalization.

There are some inherent limitations in the tape recording process which do effect video tape recording, so they will be examined now. As shown in Fig. 2, The tape has North and South magnetic fields which change according to the polarity of the AC signal. What if the frequency of the AC signal were to greatly increase?

If the speed of the tape past the head (head to tape speed) is kept the same, the changing polarity of the high frequency AC signal would not be faithfully recorded on the tape, as shown in Fig. 3.

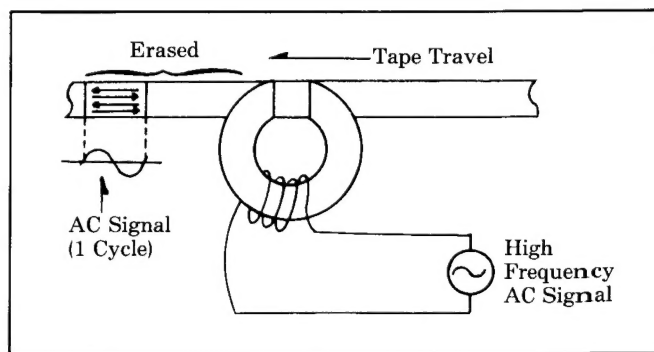


Fig. 3.

As the high frequency AC signal starts to go positive, the tape will start to be magnetized in one direction. But the AC signal will very quickly change its polarity, and this will be recorded on much of THE SAME PORTION of the tape, so North magnetic regions will be covered by South magnetic regions and vice versa. This results in zero signal on the tape, or selferasing. To keep the North and South regions separate, the head to tape speed must be increased. (See Fig. 3.)

When recording video, frequencies in excess of 4MHz may be encountered. Through experience, it is found that the head to tape speed must be in the region of 10 meters per second in order to record video signals.

The figure of 10 meters per second was also influenced by the size of the head gap. Clearly, the lower the head to tape speed, the easier it is to control that speed. If changes in head gap size were not made, the necessary head to tape speed would have been considerably higher. How the gap size influences this can be explained by Fig. 4.

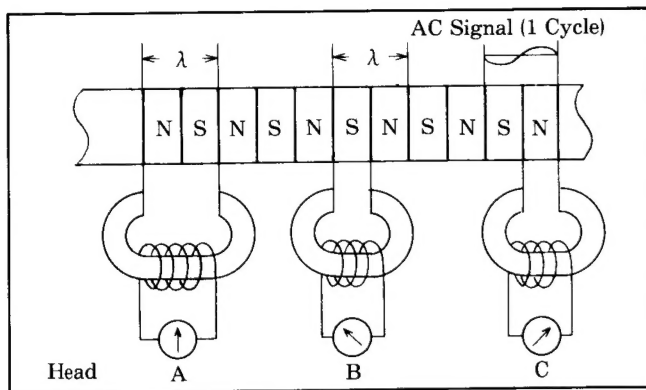


Fig. 4

Assume a signal is already recorded on the tape. The distance on the tape required to record one full AC signal cycle is called the **RECORDED WAVELENGTH** or λ . Head A has a gap width equal to λ . Here there is both North and South oriented magnetization across the gap.

This produces a net output of zero since North and South cancel. Head B and C have a maximum output because there is just one magnetic orientation across their gaps.

Maximum output occurs in heads B and C therefore, because their gap width is $1/2\lambda$. (Heads B and C would also work if their gap width is less than $1/2\lambda$.) The same is also true for recording. The maximum useable (no self-erasing) transfer of magnetic energy to the tape occurs when the gap width, G , can be expressed as.

$$G < \frac{\lambda}{2}$$

The **RECORDING WAVELENGTH**, can be expressed as:

$$\lambda = \frac{V}{f} \quad \text{where } V \text{ is the head to tape speed and } f \text{ is the frequencies to be recorded.}$$

as V increases, G is also allowed to increase for the same **MAXIMUM** frequency. Conversely if G is made very small, V is allowed to be reduced.

In practice, G can be made as small as (and smaller than) $1\mu\text{m}$ (1×10^{-6} meters) and this puts V in the area of 10 meters per second. A head to tape speed of 10 meters per second is a very high speed, too high in fact to be handled accurately by a reel to reel tape machine of reasonable size. Also, tape consumption on a high speed reel to reel machine is tremendous.

The method employed in video recording is to move the video heads as well as the tape. If the heads are made to move fast, across the tape, the linear tape speed can be kept very low.

In 2-head helical video recording (the only format which will be discussed here) the video heads are mounted in a rotating drum or cylinder, and the tape is wrapped around the cylinder. This way, the heads can scan the tape as it moves. When a head scans the tape, it is said to have made a **TRACK**. This can be seen in Fig. 5.

In 2-head helical format, each head, as it scans across the tape will record one TV field, or 262.5 horizontal lines. Therefore, each head must scan the tape 30 times per second to give a field rate of 60 fields per second.

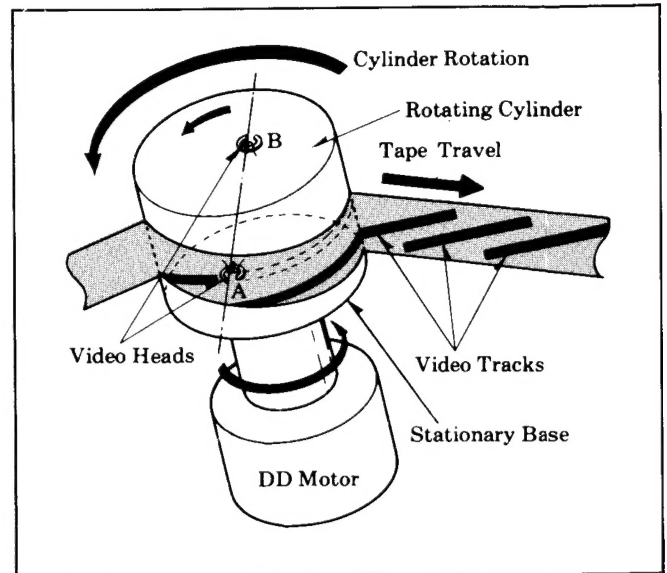


Fig. 5.

The tape is shown as a screen wrapped around the head cylinder to make it easy to see the video head. There is a second video head 180° from the head shown in front. Because the wraps around the cylinder in the shape of a helix (helica) the video tracks are made as a series of slanted lines. Of course, the tracks are invisible, but it is easier to visualize them as line. The two heads "A" and "B" make alternate scans of the tape.

An enlarged view of the video tracks on the tape can be shown : Fig. 6

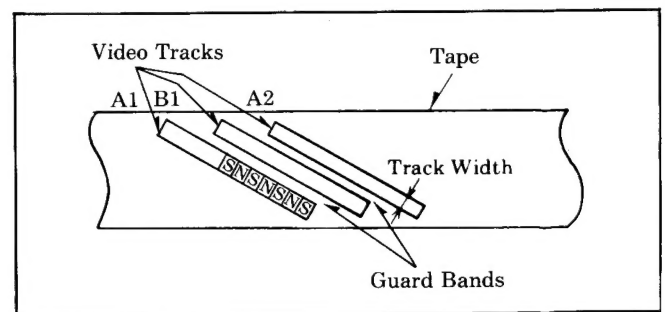


Fig. 6.

Refer to Fig. 6. The Video tracks are the areas of the tape where video recording actually takes place. The guard bands are blank areas between tracks, preventing the adjacent tracks crosstalk from appearing on the track where the video head is tracking.

There is one more point about video recording which will be discussed here. Magnetic heads have the characteristic of increased output level as the frequency increases. Then, as determined by the gap width, the maximum output occurs at

$$\text{approximately } G = \frac{V}{2f}$$

In practice, the lower frequency output of the heads is boosted in level to equal the level of the higher frequencies. This process, as also used in audio applications, is called equalization.

Video frequencies span from DC to about 4 MHz. This represents a frequency range of about 18 octaves. 18 octaves is too far a spread to be handled in one system (one machine). For instance, heads designed for operation at a maximum frequency of 4 MHz will have very low output at low frequencies. Since there is 6dB/octave attenuation, $18 \times 6 = 108$ dB difference appears. In practice this difference is too great to be adequately equalized. To get around this, the video signal is applied to an FM modulator during recording. This modulator will change its frequency according to the instantaneous level of the video signal.

The energy of the FM signal lies chiefly in the area from about 1 MHz to 8 MHz, just three octaves. Heads designed for use at 8 MHz, can still be used at 1 MHz, because the output signal can be equalized. Actually speaking, heads are designed for use up to about 5 MHz. Therefore, some FM energy is lacked but it does not affect the playback video signal, because it is resumed in the playback process.

Upon playback, the recovered FM signal must be equalized then demodulated to obtain the video signal.

CONVERTED SUBCARRIER DIRECT RECORDING METHOD

The one method of color video recording that will be discussed here is the converted subcarrier method. In order to avoid visible beats in the picture caused by the interaction of the color (chrominance) and brightness (luminance) signals, the first step in the converted subcarrier method is to separate the chrominance and luminance portions of the video signal to be recorded. The luminance signal, containing frequencies from DC to about 4 MHz, is then FM recorded, as previously described. The chrominance portion, containing frequencies in the area of 3.58 MHz is down-converted in frequency in the area of 629 kHz. Since there is not a large shift from the center frequency of 629 kHz, this converted chrominance signal is able to be recorded directly on the tape. Also note that the frequencies in the area of 629 kHz are still high enough to allow equalized playback. In practice, the CONVERTED CHROMINANCE signal and the FM signal are mixed and then simultaneously applied to the tape. Upon playback, FM and converted chrominance signals are separated. The FM is demodulated into a luminance signal again. The converted chrominance signal is reconverted back up in frequency area of 3.58 MHz. The chrominance and luminance signals are combined which reproduces the original video signal.

1. VIDEO HEAD

A. The Need for New Video Heads

We have already discussed the reduced track width. This reduction requires the use of a smaller video head. Just making them smaller does not make them better. With less of actual head material to work with, the magnetic properties of the head suffers. To offset this a change in the head material is in order. Because the VHS recorder is designed to be small, a reduction in the size of the head cylinder was called for.

A reduction in the size (diameter) of the head cylinder changes the head to tape speed. Remember, the head to tape speed affects the high frequency recording capability of the head.

To offset this problem, the head gap size was reduced.

As is well-known, Azimuth Recording is utilized in VHS.

The heart of the Azimuth Recording process is in the video heads themselves. This requires still another change in head design.

B. Head Gap

1. Width

As explained, the need for smaller head gap size became apparent. In VHS, the video heads have gap widths of a mere $0.3 \mu\text{m}$ (0.3×10^{-6} meters).

This is quite a contrast with ordinary video heads used in other helical applications whose gap widths are typically in the area of $1 \mu\text{m}$.

2. Azimuth

Azimuth is the term used to define the left to right tilt of the gap if the head could be viewed straight on. In previous VTR applications the azimuth was always set to be perpendicular to the direction of the head travel across the tape, or more simply, the video track. Fig. 7 helps explain this.

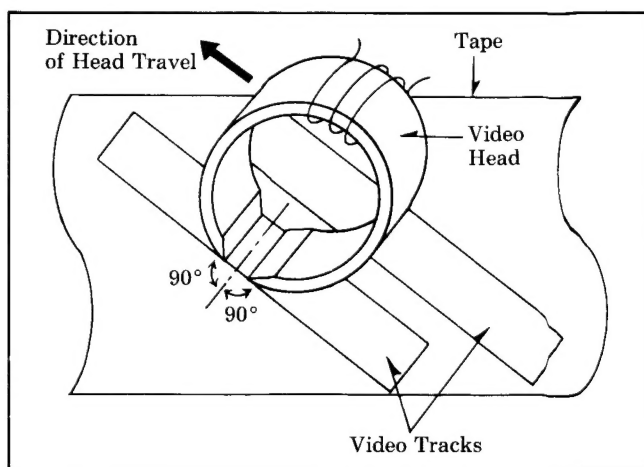


Fig. 7.

Fig. 7 shows that the gap is perpendicular to (90°) the head's movement across the tape. We can think of this standard as a perfect azimuth of 0° .

In VHS, the video heads have a gap azimuth other than 0° . And more, one head has a different azimuth from the other. The 2 values used in VHS are azimuth of $+6^\circ$ and -6° . Refer to Fig. 8 and Fig. 9.

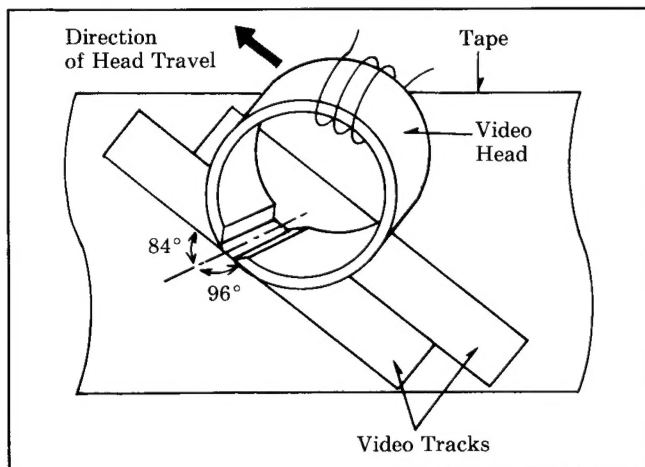


Fig. 8.

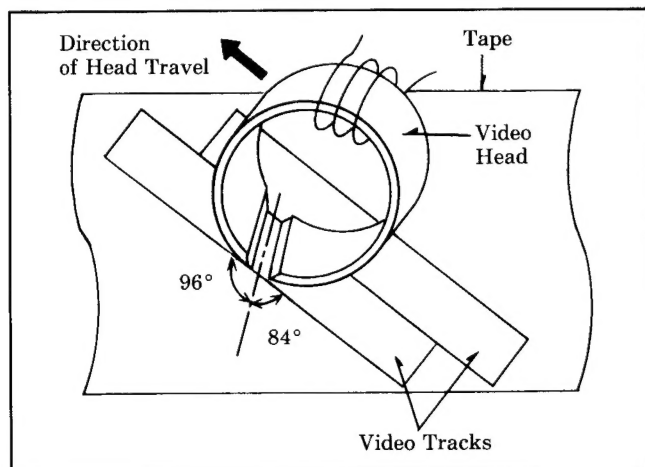


Fig. 9.

These heads make the VHS format different from most other VTR formats. Exactly how the azimuths of $\pm 6^\circ$ helps to keep out adjacent track interference is explained next.

2. AZIMUTH RECORDING

Azimuth Recording is used in VHS to eliminate the interference or crosstalk picked up by a video head. Again, because adjacent video tracks touch, or crosstalk, a video head when scanning a track will pick up some information from the adjacent track. The azimuths of the head gaps assure that video head "A" will only give an output when scanning across a track made by head "A". Head "B", therefore, only gives an output when scanning across a track made by head "B". Because of the azimuth effect, a particular video head will not pick up any crosstalk from an adjacent track. Let's examine this more closely.

In Fig. 10, we can see the VHS/SLP for example, video tracks with not-to-scale North and South magnetized regions on them.

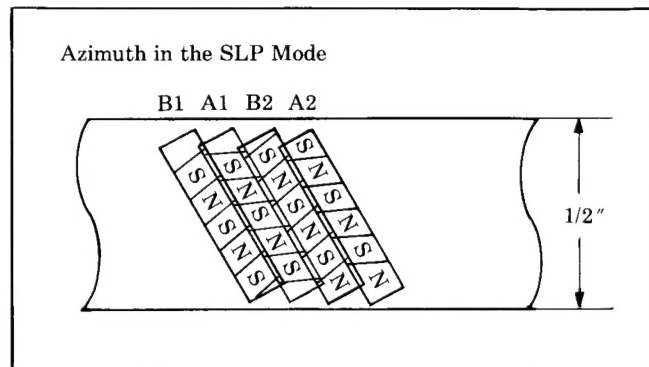


Fig. 10.

It can also be seen that these N or S regions are not perpendicular to the track, they have -6° azimuth in tracks A1, A2; and $+6^\circ$ azimuth in tracks B1, B2.

If we take track A1 and darken the N regions, it becomes easier to see Refer to Fig. 11.

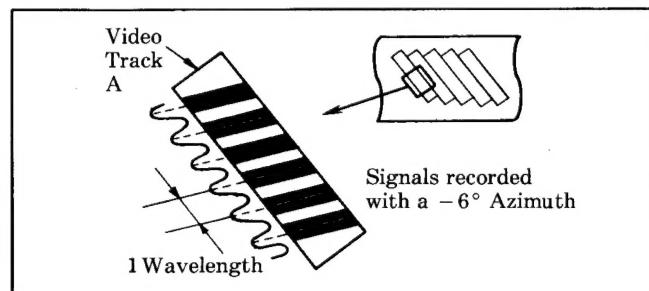


Fig. 11.

In Fig. 12, we see the information on track A, made by head "A". Imagine now that head "A" is going to play back this track, by superimposing the head over the track. Clearly, the gap fits exactly over the N and S regions, so that at any moment there is either an N region or an S region or an N to S (or S to N) transition across the gap. This produces maximum output in head "A". Now, visually superimpose the "B" head over the track. Here there are N and S regions across the gap at the same time, at any given moment. Remember that simultaneous N and S regions across the gap cause cancellation, and therefore no output. Looking at Fig. 9, we can see that the gap width is equal to $1/2$ the recorded wavelength. Recall that this occurs at the highest frequency which is to be recorded.

So therefore, the azimuth effect works at these high frequencies.

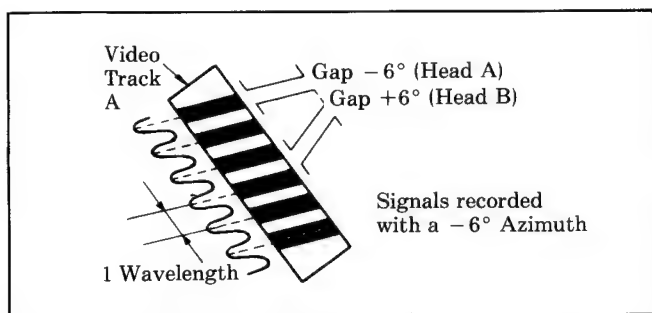


Fig. 12.

But what happens at lower frequencies? In Fig. 13, we see a diagram similar to Fig. 12, except the recorded wavelength is longer, which represents a lower frequency.

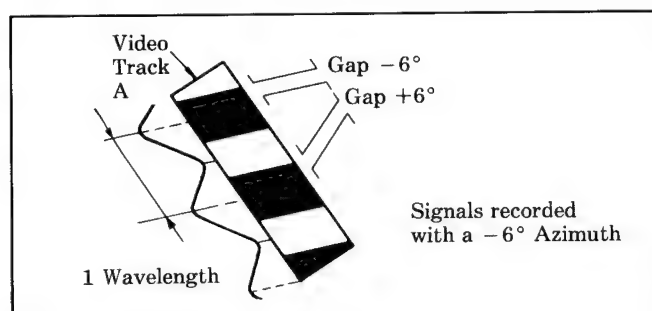


Fig. 13.

Again, visually superimpose the heads over the track. Head "A" is the same as before. But look at head "B". There is much less cancellation across the gap, and its output is close to that of head "A". Therefore, we see where the azimuth effect is dependent on frequency. The higher the frequency, the better the azimuth effect. The lower the frequency, the lower the separation by azimuth effect.

3. VHS COLOR RECORDING SYSTEM

Because there is insignificant azimuth effect at lower frequencies, a new color recording system must be adopted.

The fact that crosstalk occurs at lower frequencies cannot be changed, this happens right at the tape during playback.

The method adopted processes the crosstalk component signals from the heads so that they are eliminated. It is important to realize that the crosstalk DOES STILL OCCUR. It is the recording/playback circuitry that performs the elimination.

In ordinary Helical VTR's using converted subcarrier direct recording, the phase of the chrominance signal is untouched, recorded directly onto the tape. The chrominance signal and its phase can be represented by vectors. Vectors graphically represent the amplitude and phase of ONE frequency. In this discussion, we will consider (for simplicity) the chrominance signal to be of one frequency. As an example of vectors, see Fig. 14.

The length of any vector represents its amplitude.

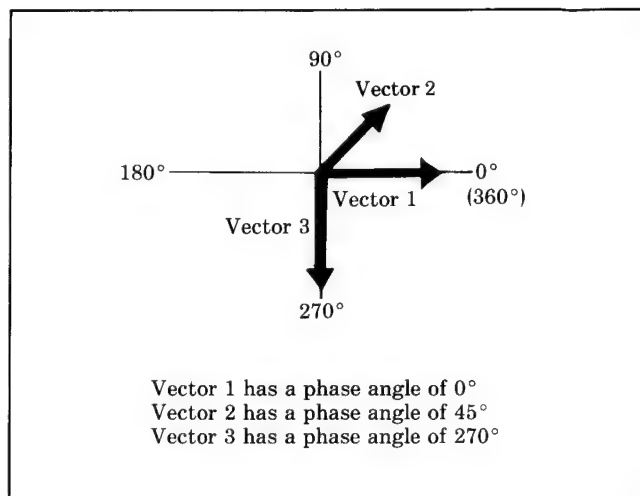


Fig. 14.

We know that the azimuth effect will not work at the lower frequencies. And since the color information in VHS is recorded at low-converted frequencies, a new method of color recording was adopted.

Vector Rotation in Recording is actually a phase shift process that occurs at a horizontal rate, 15,734Hz.

The chrominance signal can be represented by a vector, showing amplitude and phase. (1).

In ordinary Helical Scan VTR's the vector is of the same phase for every horizontal line, on every track as shown in Fig. 15.

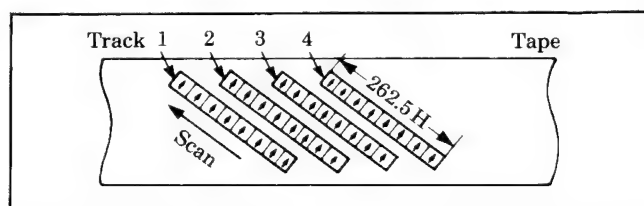


Fig. 15.

In VHS, we still convert the 3.58MHz down to a lower frequency, namely 629kHz, but the new color method used in VHS format is a process of vector rotation. During recording the CHROMINANCE phase of each horizontal line is shifted by 90° . For head "A" (CHANNEL 1) we ADVANCE the CHROMINANCE phase by 90° per horizontal line (H). For head "B" (CHANNEL 2) we DELAY the chrominance phase 90° per H.

VECTOR (PHASE) ROTATION:

CHANNEL 1 $+90^\circ/H$

CHANNEL 2 $-90^\circ/H$

Fig. 16 shows what this looks like on tape.

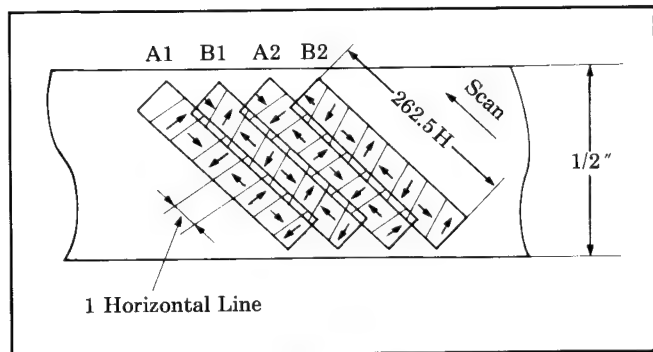


Fig. 16.

Now assume that head "A" plays back over track A1 it will produce a vector output as such:

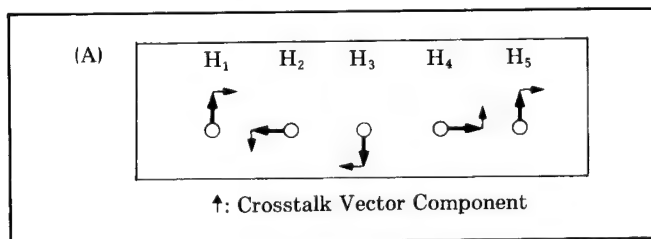


Fig. 17

Head "A" when tracking over A1 will have an output consisting of the main signal (large vectors) and some crosstalk components (small vectors).

Fig. 17, then is a vector representation of the playback chrominance signal from the head.

One of the most important things down in the playback process is the restoration of the vectors to their original phase. This is done by the balanced modulator in the playback process.

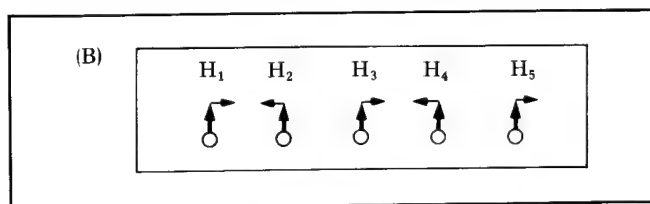


Fig. 18.

This restored signal is then split 2 ways. One path goes to one input of an adder. The other path goes to a delay line which delays the signal by 1 H. The output of the delay line goes to the other input of the adder. Fig. 19 explains.

As can be seen in Fig. 21, the crosstalk component has been eliminated after the first H line. We have now a chrominance signal free of adjacent channel crosstalk.

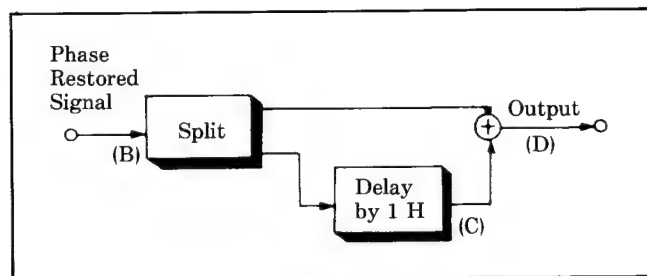


Fig. 19.

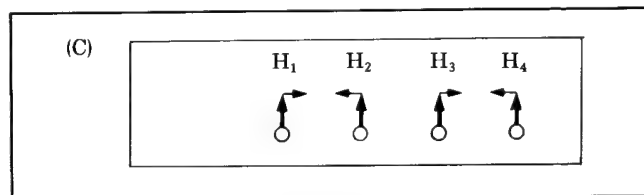


Fig. 20.

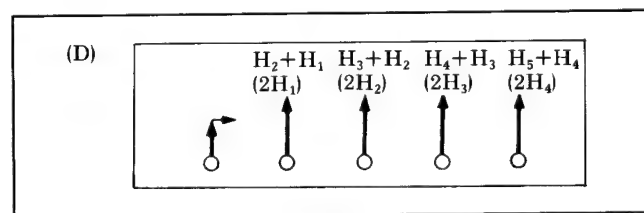


Fig. 21.

The double output in Fig. 21 is not a problem because it can always be reduced. The process of adding a delayed line to an undelayed line is permissible because any 2 adjacent lines in a field contain nearly the same chrominance information.

So, if 2 adjacent lines are added, the net result will produce no distortion in the playback picture.

In conjunction with the crosstalk elimination is the reconversion of the chrominance 629kHz to its original 3.58MHz. Now the color signal is totally restored.

GLOSSARY OF TERMS

ACC

Automatic Color Control used to maintain an overall constant color signal level in the color circuits.

ACK

Automatic Color Killer.

Adjacent Track

This is the name of the video track to the immediate left or right of the track of concern.

AFC

Automatic Frequency Control used to phase-lock the color circuits to either the recording or playback color signal, in order to achieve a stable color signal.

AFT

Automatic Fine Tuning...This is a special circuit found in most recent TV sets which makes the local oscillator of the TV tuner follow the channel of concern in order to produce a stable IF frequency. In other words, if for any reason the TV station being received changes frequency, the AFT circuit will automatically compensate so that no interference will be seen on the screen, i.e., no manual fine tuning is necessary.

AGC

Automatic Gain Control used to maintain an overall constant picture level in the luminance circuits.

APC

Automatic Phase Control used to help phase lock the color circuits to either the recording or playback color signal in order to achieve a stable color signal.

Azimuth

A term used to describe the left to right tilt of the gap of a recording head, if it could be viewed straight on.

Balanced Modulator

A circuit so designed to give as an output the frequency sum or frequency difference of its two input signals. Any special characteristics of one of the input signals will be present in the output signal.

Beats

A term used to describe the unwanted signals produced when two original signals are allowed to be mixed together.

Bipolar PG

Pulse Generator signals that have both positive and negative excursions.

Burst

A short time occurrence (8 to 10 cycles) of the 3.58MHz subcarrier signal, appearing right after horizontal sync but centered on the blanking portion of the video waveform. Burst is used to keep the color oscillator of a TV receiver locked to the broadcast station.

B/W

Abbreviation for Black and White.

C

Capacitor.

C Signal

The color portion of a video signal.

Capstan

A small rotating metal dowel which drives the recording tape to assure positive tape movement.

Chroma

The color portion of a video signal.

Chrominance

The color portion of a video signal.

Clamp

The process of giving an AC signal a specific DC level.

Control Signal

A special signal recorded onto the video tape which is used during playback as a reference for the servo circuits.

Converted Subcarrier

This is the process of frequency shifting the color 3.58MHz subcarrier and its sidebands down to 629kHz.

Crosstalk

The name given to the unwanted signals obtained when a video head picks up information from an adjacent track.

CUE

To scan the playback picture at a faster than normal speed in the Forward direction.

D

Diode.

DL

Delay Line.

Dark Clip

After emphasis, the negative going spikes (undershoot) of a video signal may be too large in amplitude for safe FM modulation. A dark clip circuit is used to cut off these spikes at an adjustable level.

DDC

Direct Drive Cylinder...as used in VHS, this means that the video heads are driven by a self-contained brushless DC motor using no belts or gears. DD cylinders produce pictures with better stability.

Delta Factor (Δf)

A term used to indicate that a playback signal off the video tape has some jitter or "wow and flutter". Δf , or "a change in frequency" means that the color signal off the tape is not a stable frequency of 629kHz, but rather a signal whose frequency at any instant is some small amount above or below 629kHz.

Deviation

A term used to describe how far the FM carrier swings when it is modulated. In VHS the upper limit is 4.4MHz.

Dew Detector

A variable resistor whose resistance value depends upon the ambient humidity.

Dihedral

A term used to describe the relative position between the two video heads as they are mounted in the head cylinder. Perfect dihedral means that the tips of the heads are exactly 180° apart.

Dropout

A momentary absence of FM or color signal off the tape, whether due to uneven oxide or a coating of dust on the tape or video heads.

Duty Cycle

In describing a rectangular waveform, the "duty" refers to the percentage of off time and on time for one complete cycle. 50—50 means that there are equal periods of off time and on time for one cycle and this would be a square wave.

E-E

Electronics to Electronics...this is the picture viewed on the TV set when a recording is being made. This picture goes through some but not all of the circuits of the recorder and is used to test the operation of said circuits.

EQ

Shortened form of "Equalization", used in the audio circuits.

Emphasis

The process of boosting the level of the high frequency portions of the video signal.

FG

Frequency Generator used in the servo circuits.

FL

Filter.

FM Signal

The luminance portion of the video signal is used to control the frequency of astable multivibrator. The output of this multivibrator is a frequency modulated (FM) signal shifting from 3.4 MHz to 4.4 MHz (plus sidebands).

Field

One half of a television picture. A field consists of 262.5 horizontal scanning lines across the picture tube. Two fields are necessary to complete a fully scanned TV picture (frame). First, one field is "sprayed" on the picture tube, starting at the top of the tube with Line 1, and ending at the bottom with Line 262.5. Then, the next field begins at the top of the tube again with Line 262.5 and ends at the bottom with Line 525. The lines of the second field lie in-between the lines of the first field. This property of falling in-between lines is called "interlacing". The two sweeps of the picture tube, or two fields make up one complete TV picture of "frame". Frame repetition is 30 Hz, therefore field repetition is 60 Hz.

Flagwaving

This is the term used to describe a TV set's ability to accept unstable playback pictures from a video tape recorder. All home VTR's have some degree of playback instability. A TV set with a long horizontal AFC time constant may not recover from the VTR's instability before the active picture is being scanned. This can cause a bending or flapping from side to side of the top inch or so of the screen. This movement is called "flagwaving".

Frame

One complete TV picture. See "Field".

Gate

A circuit which will deliver an output only when a specific combination of its inputs are present. For use in analog or digital applications.

Guard Band

This is the space between video tracks on the video tape in the SP mode. Guard bands contain no information.

Hall Effect IC

An external magnetic field causes current to flow in this type of device.

HD

Horizontal Drive signal.

Head Cylinder

A cylindrical piece of metal which houses the video heads. The tips of the heads protrude slightly from the surface of the cylinder so that they may scan the tape as the cylinder spins.

Head Switching

The action of turning off during playback, the video head which is not in contact with the video tape. A particular video head will be turned off 30 times per second. This is done so that the head which is not scanning the tape, and therefore not delivering a good signal, cannot contribute any noise to the playback signal.

Head Switching Pulse

The signal which is applied to the Head Amplifier to perform head switching. This is a square wave at 30 Hz, with a 50—50 duty cycle.

Helical

A word used to describe a general type of VTR in which the tape wraps around the video head cylinder in the shape of a 3-dimensional spiral, or "helix". The video tracks are recorded as a series of slanted lines.

IC

Integrated Circuit.

Interchangeability

A term used to describe how well a particular VTR will play back a tape recorded on another VTR of the same type. Good interchangeability indicates good playback.

Interlacing

The property of the scan lines of two television fields to lie in-between each other. See "Field".

Interleaving

A term used to indicate that the harmonics of the chrominance signal lie in-between the harmonics of the luminance portion of the video signal as it is viewed on a spectrum analyzer. This means that the color information of a video signal does not interfere with, although it is broadcast at the same time as, the luminance information.

Also, signals which have this interleaving property are not readily seen on a TV screen, because of their virtual cancellation characteristics.

Interleaving signals (fi) must have the following frequency relationship:

$$f_i = \left(\frac{2n+1}{2} \right) \times f_H \quad (n=0, 1, 2, 3, 4, \dots)$$

$$f_H = 15,734 \text{ Hz (H sync frequency)}$$

Jitter

The name of the effect on the playback picture if a VTR has too much "wow and flutter". The picture appears to have a rapid shaking movement.

L

Coil.

Luminance

This is the portion of video signal which contains the sync and B/W information.

MMV

Monostable Multi-Vibrator...Usually an IC device which gives a logic high or low output with a variable duration upon receipt of an input pulse or transition.

Non-Linear Emphasis

This is similar to regular emphasis with the difference that small level high frequency portions of the signal are given more of a boost than higher level high frequency portions.

NTSC

The National Television Systems Committee. These four letters identify the United States color television standard.

O.T.R.

One Touch Recording (O.T.R.) enables you to do impromptu timer recordings at any time. When you have to go out for urgent matters or you are going to sleep, this function is very useful. Just select the channel and push the O.T.R. Button for 30 minutes to 2 hours of recordings. After recording, the VCR will be turned off automatically.

PG

Pulse Generator used in the servo circuits.

Q

A term used to describe the graphic response of a filter or tuned amplifier.

R

Resistor.

Review

To scan the playback picture at a faster than normal speed in the Reverse direction.

RF

Radio Frequencies.

Rotary Chroma

The name of the process used in VHS to change the phase of the chrominance signal at a rate of 15,734 (same as H sync frequency) times per second.

Rotary Transformer

A device used to magnetically couple RF signals to and from the spinning video heads, thus eliminating the need for brushes.

Sample and Hold

A process used in comparator circuits by which the value of a particular signal is measured at a specific moment in time...then this value is stored for later use.

Search

To scan the playback picture at a faster than normal speed in either the forward or reverse direction.

Servo

Short for Servo mechanism. This is an electro-mechanical device whose mechanical operation (for instance motor speed) constantly being measured and regulated so that it closely matches or follows an external reference.

Skew

Another way of saying Tension Error. Skew is actually the change of size or shape of the video tracks on the tape from the time of recording to the time of playback. This can occur as a result of poor tension regulation by the VTR, or by ambient conditions which affect the tape.

Subcarrier

The name of the 3.58 MHz continuous wave signal used to carry color information.

SS

Slow and Still.

T

Transformer.

TP

Test Point.

TR

Transistor.

Tension Error

See "Skew".

Time Base Stability

A term used to describe how closely the playback video signal from a VTR matches an external reference video signal...in regard to sync timing rather than picture content.

Tracking

This is the action of the spinning video heads during playback when they accurately track across the video RF information laid down during recording. Good tracking indicates that the heads are positioning themselves correctly, and are picking up a strong RF signal. Poor tracking indicates that the heads are off track, and picking up low level RF signal or noise.

VCO

Voltage Controlled Oscillator...An oscillator whose frequency of oscillation is governed by an external voltage.

Video Head

This is the electro-magnet used to develop magnetic flux which will put RF information on the tape. In VHS, two video heads are mounted in a rotating cylinder around which the video tape is wrapped. As the cylinder spins, each video head is allowed to alternately scan the tape.

Video Track

The name of the RF information laid down during recording, as a particular video head scans across the tape.

VHS

Video Home System.

VTR

Video Tape Recorder.

VV

Video to Video...or...the actual playback picture produced from a tape during playback.

VXO

Voltage Controlled Crystal Oscillator...Similar to VCO except that a quartz crystal is used as a reference which can be varied.

White Clip

After emphasis, the positive going spikes (overshoot) of the video signal may be too large for safe FM modulation. A white clip circuit is used to cut off these spikes at an adjustable level.

XTAL

Abbreviation for crystal.

Y Signal

The B/W portion of a video signal containing B/W information and sync.

Panasonic[®]
MATSUSHITA ELECTRIC

Service Manual

Vol. 2

Video Cassette Recorder

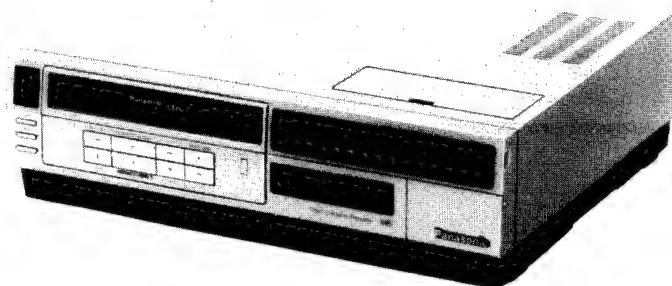
Panasonic
Omnivision **VHS**
PV-1520

Mechanical Adjustment Procedures

Electrical Adjustment Procedures

SPECIFICATIONS

Power Source:	120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
Power Consumption:	Approx. 24 watts (When the Power switch is OFF, Approx. 11 watts)
Television System:	EIA Standard (525 lines, 60 fields) NTSC color signal
Video Recording	
System:	4 rotary heads helical scanning system
Luminance:	FM azimuth recording
Color signal:	Converted subcarrier phase shift recording
Audio Track:	1 track
Tape Format:	Tape width 1/2" (12.7 mm), high density tape
Tape Speed:	SP mode: 1-5/16 i.p.s. (33.35 mm/s) LP mode: 21/32 i.p.s. (16.67 mm/s) SLP mode: 7/16 i.p.s. (11.12 mm/s)
Record/Playback Time:	8 HRS. with 160 min. type tape used in SLP mode
FF/REW Time:	Less than 6 min. with 120 min. type tape
Heads:	Video: 4 rotary heads Audio/Control: 1 stationary head
Erase:	1 full track erase 1 audio track erase
Input Level:	Video: VIDEO IN Jack (RCA type) 1.0 Vp-p, 75 Ω unbalanced Audio: AUDIO IN Jack (RCA type) -20 dB, 50 k Ω unbalanced
TV Tuners:	VHF Input: Ch2-Ch13, Cable Channels "A"—"W" 75 Ω unbalanced UHF Input: Ch14-Ch83, 300 Ω balanced
Output Level:	Video: VIDEO OUT Jack (RCA type) 1.0 Vp-p, 75 Ω unbalanced Audio: AUDIO OUT Jack (RCA type) -6 dB, 600 Ω unbalanced
RF Modulated:	Ch3/Ch4 switchable, 72 dB μ , (Open Voltage) 75 Ω unbalanced



Video Horizontal

Resolution: Color: more than 230 lines
B/W: more than 230 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
(10 dB down) LP mode: 100 Hz ~ 6 kHz
SLP mode: 100 Hz ~ 5 kHz

Signal-to-Noise Ratio: Video: SP mode: better than 41 dB
LP mode: better than 41 dB
SLP mode: better than 41 dB
(Rohde & Schwarz noise meter)
Audio: SP mode: better than 42 dB
LP mode: better than 40 dB
SLP mode: better than 40 dB

Operating

Temperature: 41°F—104°F (5°C—40°C)

Operating Humidity: 10%—75%

Weight: 20.1 lbs. (9.1 kg)

Dimensions: 16-15/16" (W) \times 14-5/16" (D) \times 5-1/8" (H)
(430 mm \times 364 mm \times 130 mm)

Accessories Supplied:

- Wireless remote control unit
- VHF matching box 75 Ω —300 Ω transformer
- 300 Ω —75 Ω transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable
- Video cassette tape, NV-T60

Available Tapes:

1/2" VHS video cassette tapes
NV-T160 Approx. 1073 ft. (327 mm), 160, 320, or 480 min.
NV-T120 Approx. 810 ft. (247 mm), 120, 240, or 360 min.
NV-T60 Approx. 417 ft. (127 m), 60, 120, or 180 min.

Weight and dimensions shown are approximate. Designs and specifications are subject to change without notice.

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CONTENTS

SPECIFICATIONS.....	Cover
MECHANICAL ADJUSTMENT PROCEDURES.....	2- 1
DISASSEMBLY OF CABINET PARTS	2- 1
1. DISASSEMBLY FLOWCHART.....	2- 1
2. DETAILED DISASSEMBLY METHOD.....	2- 1
ADJUSTMENT PROCEDURES.....	2- 3
1. REPLACEMENT OF UPPER CYLINDER UNIT	2- 3
2. REPLACEMENT OF D.D. CYLINDER UNIT.....	2- 5
3. CONFIRMATION OF DISCHARGE ANGLE UNIT INSTALLATION POSITION	2- 5
4. POSITION ADJUSTMENT OF CASSETTE GUIDE PIN.....	2- 6
5. POSITION ADJUSTMENT OF PRESSURE ROLLER	2- 6
6. CONFIRMATION OF TAPE SPEED	2- 7
7. POSITION ADJUSTMENT OF TENSION POST	2- 8
8. MEASUREMENT AND ADJUSTMENT OF BACK TENSION	2- 8
9. CONFIRMATION OF BRAKE TORQUE	2- 9
10. CONFIRMATION OF TAKEUP TORQUE	2-10
11. POSITION ADJUSTMENT OF SAFETY SWITCH	2-10
12. HEIGHT ADJUSTMENT OF REEL TABLES.....	2-11
13. HEIGHT ADJUSTMENT OF TAPE GUIDE POSTS (ROUGH ADJUSTMENT)	2-11
14. TAPE INTERCHANGEABILITY ADJUSTMENT (FINAL ADJUSTMENT).....	2-12
15. ADJUSTMENT OF V-STOPPERS.....	2-16
16. ADJUSTMENT OF CAM GEAR AND MODE SELECT SWITCH	2-16
17. ADJUSTMENT OF CASSETTE UP GEARS.....	2-18
18. ADJUSTMENT OF CASSETTE UP SWITCH.....	2-22
SERVICING FIXTURES & TOOLS	2-23
ELECTRICAL ADJUSTMENT PROCEDURES	2-24
1. TEST EQUIPMENT	2-24
2. ADJUSTMENT PROCEDURES.....	2-24
2-1. SERVO SECTION.....	2-24
2-2. AUDIO SECTION	2-26
2-3. VIDEO SECTION	2-27
2-4. SYSTEM CONTROL SECTION	2-36
2-5. TV DEMODULATOR SECTION	2-37
2-6. IR WIRELESS RECEIVING DETECTOR SECTION	2-41
LOCATION OF TEST POINTS AND CONTROLS.....	2-43

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

MECHANICAL ADJUSTMENT PROCEDURES

DISASSEMBLY OF CABINET PARTS

1. DISASSEMBLY FLOWCHART

This flowchart indicates disassembly steps of the cabinet parts and the Bottom PC Boards in order to find the item(s) necessary for servicing. When reassembling, perform the step(s) in the reverse order. Bottom Plate can be removed separately.

Note:

1. When removing the front panel, work with care so as not to break the locking portions of the panel.

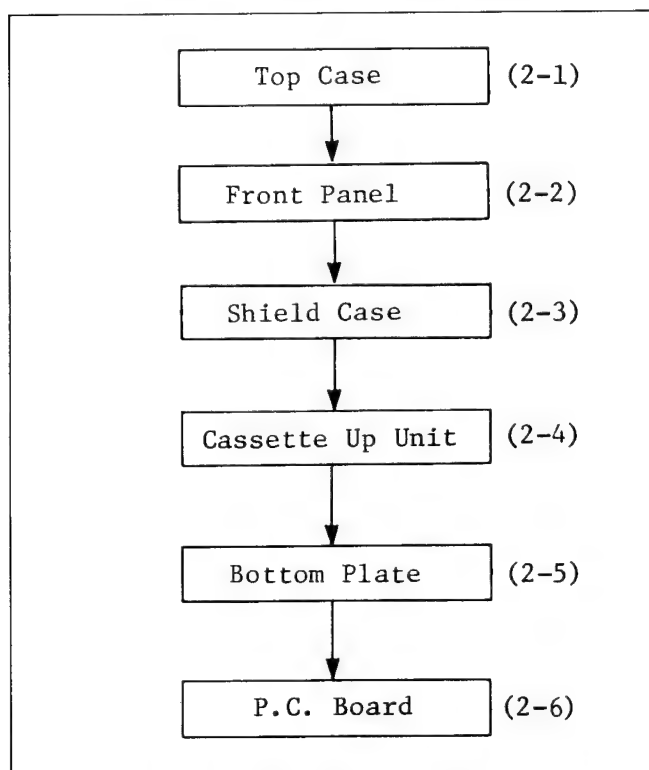


Fig. M1 Disassembly Flow Chart

2. DETAILED DISASSEMBLY METHOD

2-1. Removal of the Top Case

Remove 2 screws (A).

Then pull the top case toward the back and then carefully lift the front portion to remove.

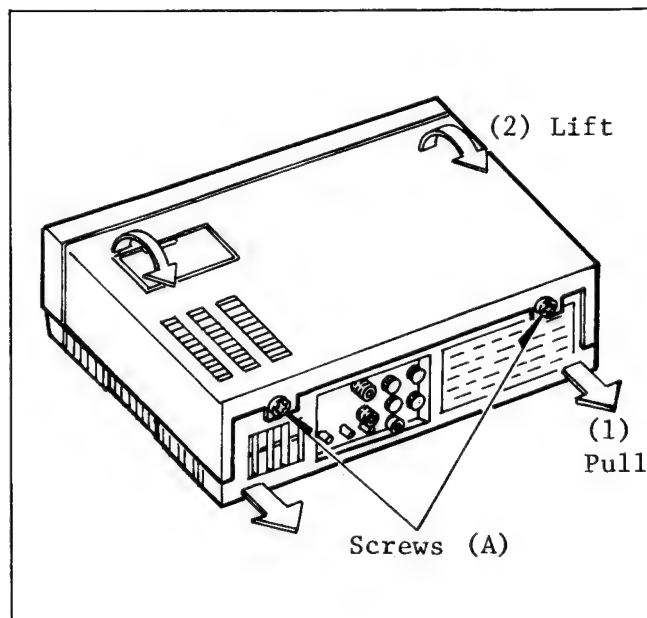


Fig. M2 Removal of Top Case

2-2. Removal of the Front Panel

Release 3 locking tabs. Then hold both right and left top portions of the panel and turn it toward the front of deck to remove.

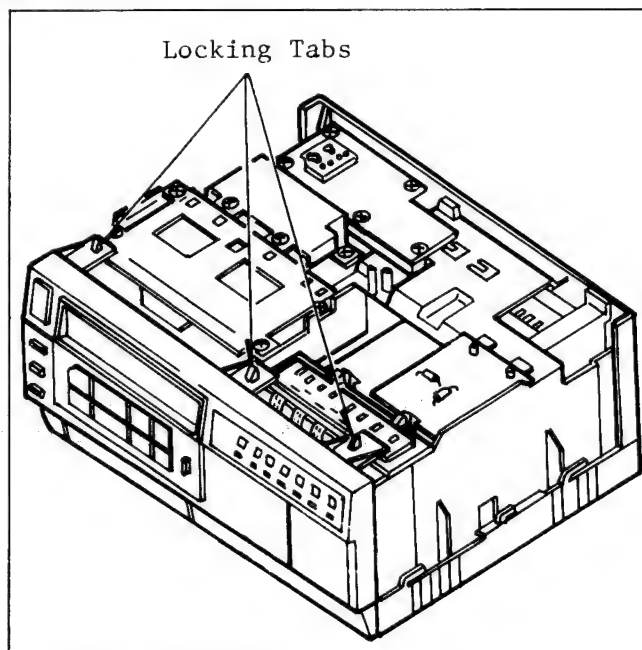


Fig. M3 Removal of Front Panel

2-3. Removal of the Shield Case.

Remove 3 Screws (B) and Carefully lift the Shield Case.

2-4. Removal of the Cassette Up Unit.

Remove 4 Screws (C) and unplug the connector P1551 on connection C.B.A. Then remove Cassette Up Unit.

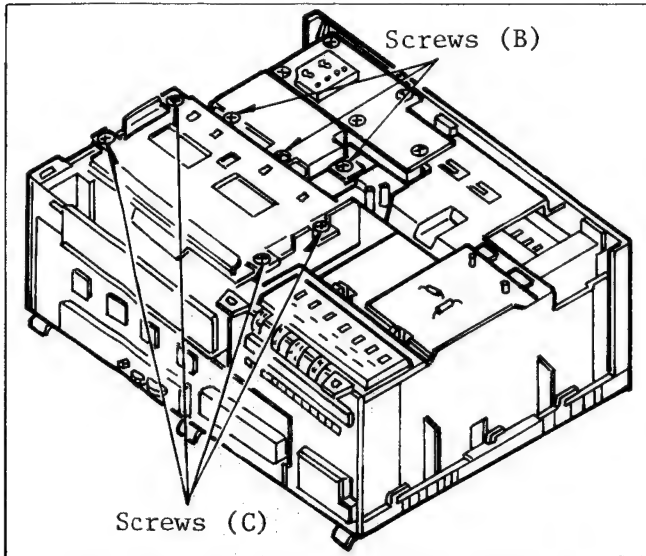


Fig. M4 Removal of Shield Case & Cassette UP Unit

2-5. Removal of the Bottom Plate

Place the deck so that the left side faces down, hold the deck with your hand and remove 6 screws (D).

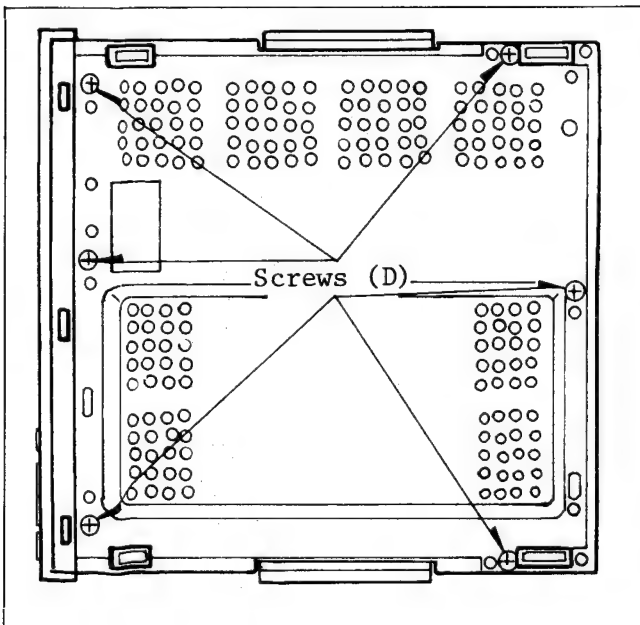


Fig. M5 Removal of Bottom Plate

2-6. Opening of the P.C. Boards (Bottom, Front, Potentiometer).

Place the deck so that the left side faces down, hold the deck with your hand and remove 1 red screw (E).

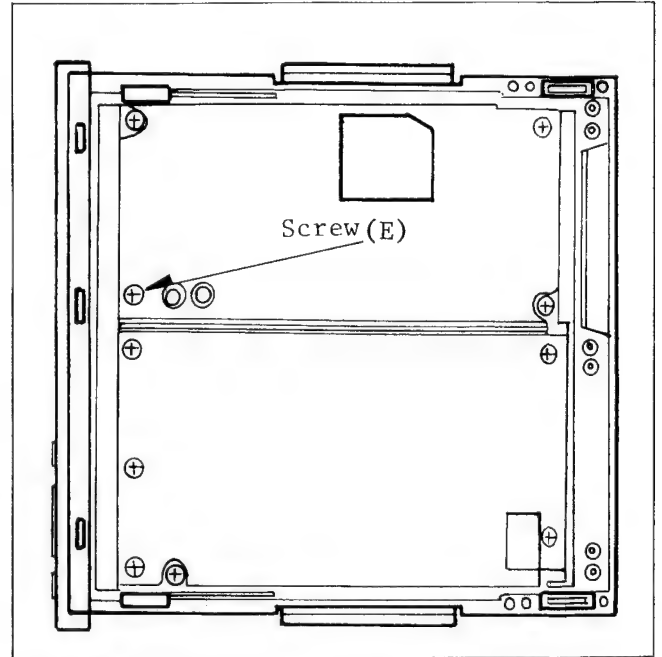


Fig. M6 Opening of PCBs (Bottom, Front, Potentiometer)-(1)

Place the deck in the normal operating position. Next release the 5 locking tabs of front P.C. Boards and the 2 locking tabs of Potentiometer P.C. Board.

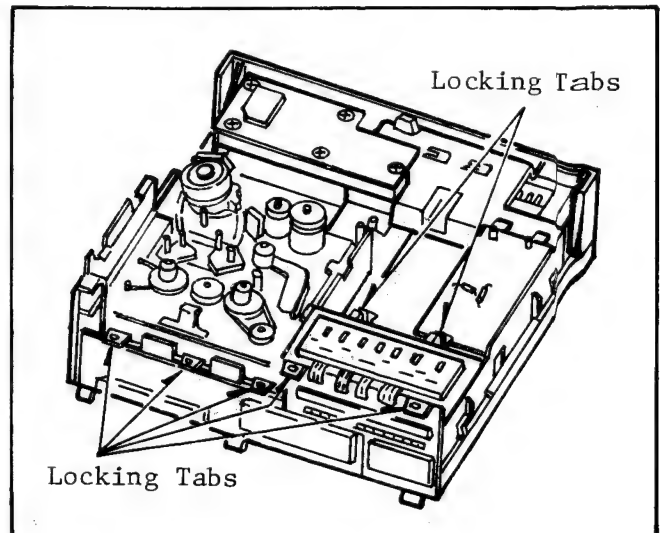


Fig. M7 Opening of PCBs (Bottom, Front, Potentiometer)-(2)

Place the deck so that the left side down. Then open the P.C. Boards (Bottom, Front, Potentiometer).

PROCEDURE FOR CLEANING OF UPPER CYLINDER UNIT

1. Position the video head to permit access for cleaning and hold the upper cylinder to keep it from turning while cleaning.
2. Gently rub the video head in direction of tape travel with Head Cleaning Stick (VFK27) moistened with freon TF
3. Repeat for the other video head.

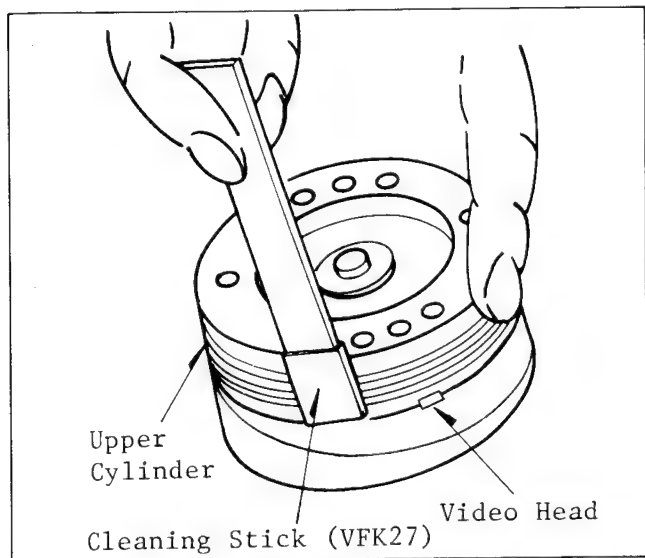


Fig. M8 Head Cleaning

Note :

1. Do not rub vertically.
2. Do not apply any pressure to head. If contaminant is not easily removed, continued gentle wiping will usually remove the substance.

ADJUSTMENT PROCEDURES

1. REPLACEMENT OF UPPER CYLINDER UNIT

Work with extreme care when removing or replacing the upper cylinder unit. Do not touch video heads during servicing.

1. Unsolder the 8 lead pins on the Head Relay Board.
2. Remove the 2 screws and gently lift the upper cylinder unit from the shaft.

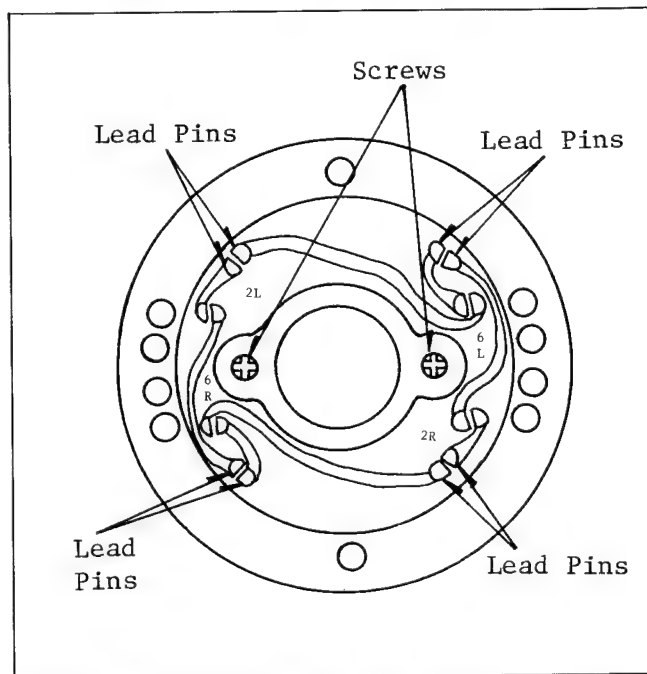


Fig. M9 Replacement of Upper Cylinder Unit-(1)

3. Before reinstalling a new unit, clean the DD cylinder shaft and the surface that it engages with on the upper cylinder with a soft cloth dampened with Freon TF.

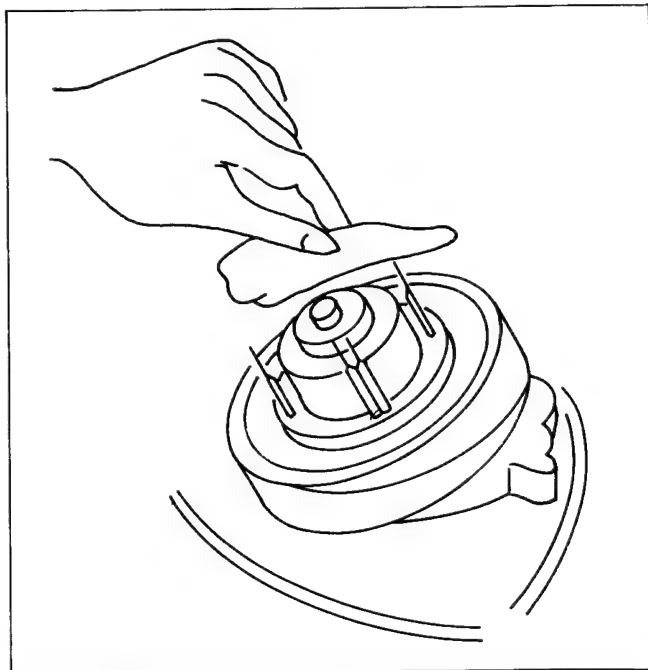


Fig. M10 Replacement of Upper Cylinder Unit-(2)

4. Install new upper cylinder unit carefully so that the 8 lead pins are properly matched on the Head Relay Board.

For details on the installation position, refer to Fig. M11. (A or B)

Note:

Install 8 lead pins with an extreme care not to damage them.

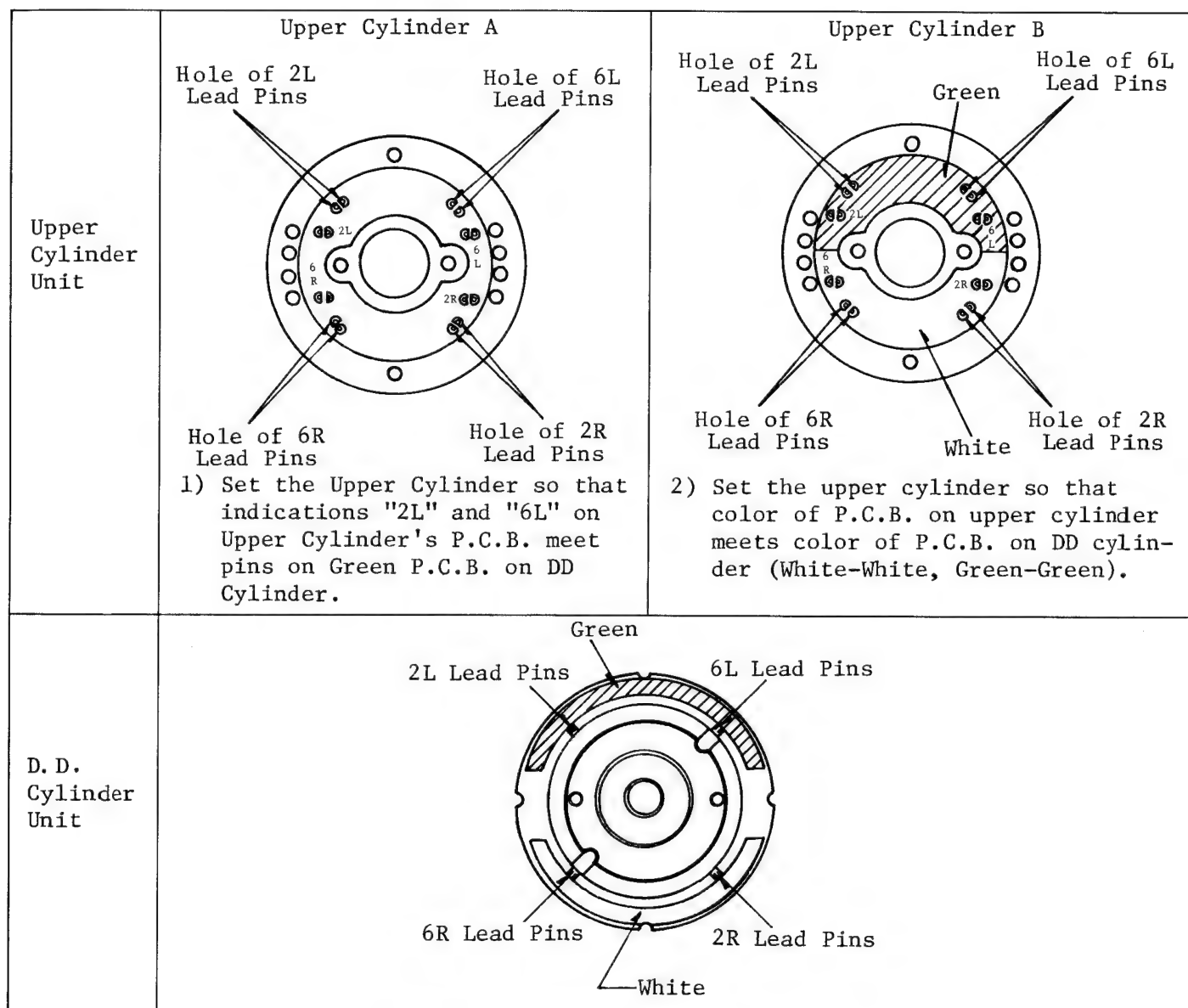


Fig. M11 Replacement of Upper Cylinder Unit-(3)

5. Tighten the 2 screws and resolder the 8 lead pins to the Head Relay Board.
6. Clean the Upper Head Cylinder with a deerskin swab saturated with Freon TF.

Note:

Upon completion of replacement, confirm performance. And if required, perform "TAPE INTERCHANGEABILITY ADJUSTMENT".

2. REPLACEMENT OF D.D. CYLINDER UNIT

Work with extreme care when removing or replacing the D.D. cylinder unit.
Do not touch video heads during servicing.

1. Remove the screw and shield case on connectors.
2. Disconnect 2 connectors (P1501 and P1502) from the D.D. cylinder unit.
3. Remove screw (A) and discharge angle.
4. Remove the D.D. cylinder unit by removing 3 screws (B).

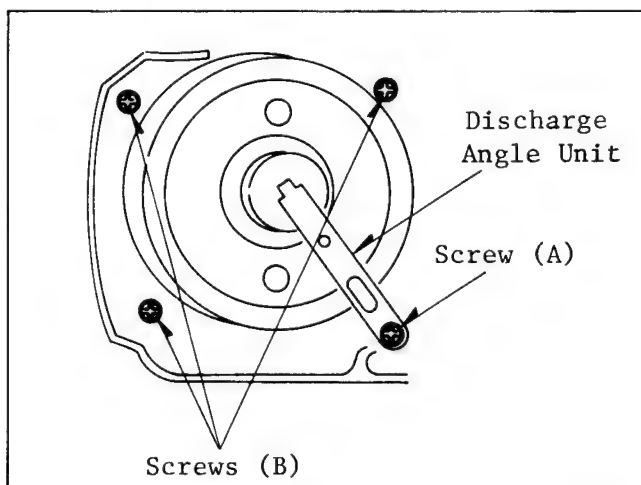


Fig. M12 Replacement of D.D. Cylinder Unit - (1)

Note:

Since there is very little clearance between D.D. cylinder unit and chassis, remove the D.D. cylinder unit gently and carefully.

5. Remove the upper cylinder unit from the D.D. cylinder and reinstall it on new one. To perform this step, refer to "REPLACEMENT OF UPPER CYLINDER UNIT" section.
6. Reinstall the new D.D. cylinder unit, and connect the P1501 and P1502. Reinstall the shield case and Discharge Angle Unit.

Notes:

1. When reinstalling the New D.D. Cylinder Unit, fit the New D.D. Cylinder Unit to the chassis by turning it counterclockwise.

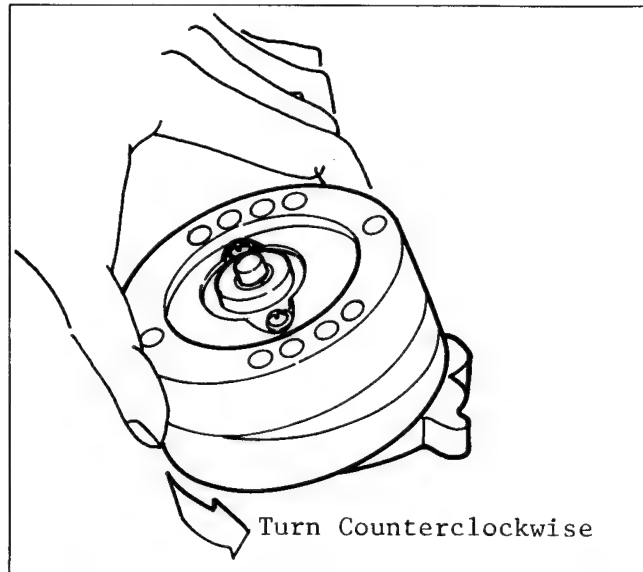


Fig. M13 Replacement of D.D. Cylinder Unit - (2)

2. Upon completion of replacement, confirm performance. Perform "TAPE INTERCHANGEABILITY ADJUSTMENT".

3. CONFIRMATION OF DISCHARGE ANGLE UNIT INSTALLATION POSITION

Check to see if the discharge angle unit is correctly set in a position within 1 mm to the UP side from the center of the cylinder shaft as show in Fig. M14.

Note:

Never install the discharge angle unit to any position to the down side from the center of the cylinder shaft, but always within a maximum of 1 mm to the UP side of the center of this shaft.

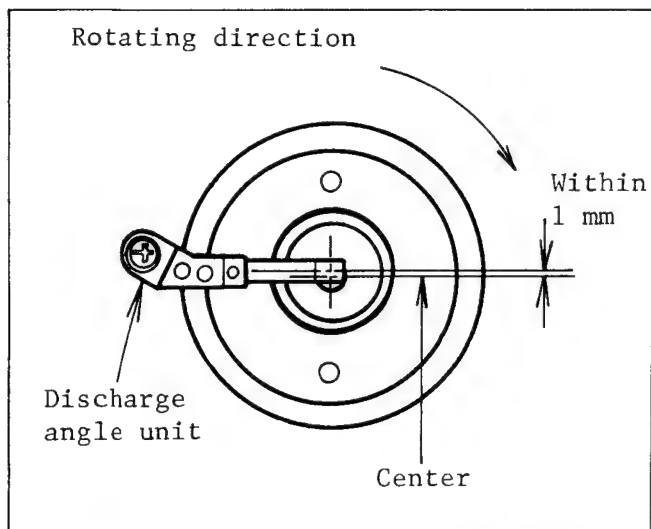


Fig. M14 Confirmation of Discharge Angle Unit Position

4. POSITION ADJUSTMENT OF CASSETTE GUIDE PIN

This adjustment is required only when the cassette guide pin has been replaced or it's mounting screw has been loosened.

* Equipment Required:

Guide Pin Fixture (VFKS0006)

1. Remove the Top Case, Front Panel, Shield Case and the Cassette Up Unit.
2. Move the Pressure Roller back with your finger and slightly loosen screw (A).

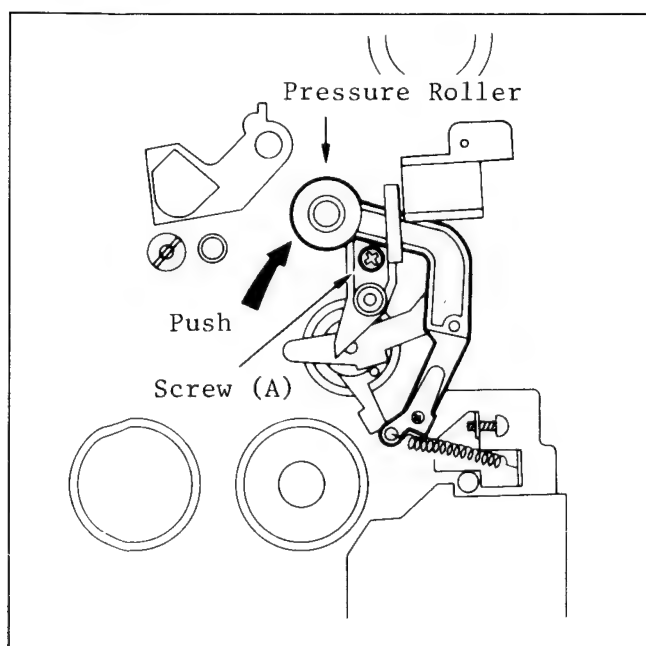


Fig. M15 Adj. of Cassette Guide Pin-(1)

3. Install the guide pin fixture and move it so that the capstan shaft fits snugly in the notch of the fixture and adjust the guide pin as shown below. Then tighten screw (A).

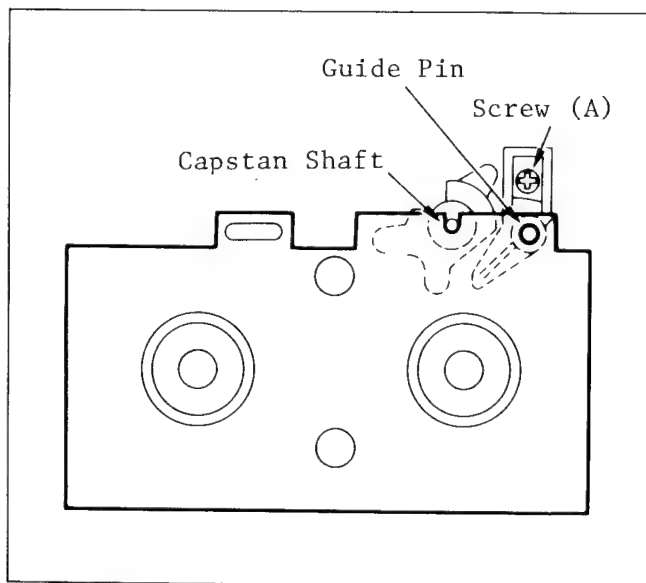


Fig. M16 Adj. of Cassette Guide Pin-(2)

5. POSITION ADJUSTMENT OF PRESSURE ROLLER

A: Specification: $1.2 \begin{matrix} +0.3 \\ -0.5 \end{matrix} \text{mm}$

1. Turn power ON and insert the tape. Confirm the TAPE IN DISPLAY is ON, then remove the cassette up unit. Then manually hold safety switch back then push the PLAY and REC button to put machine in REC mode.

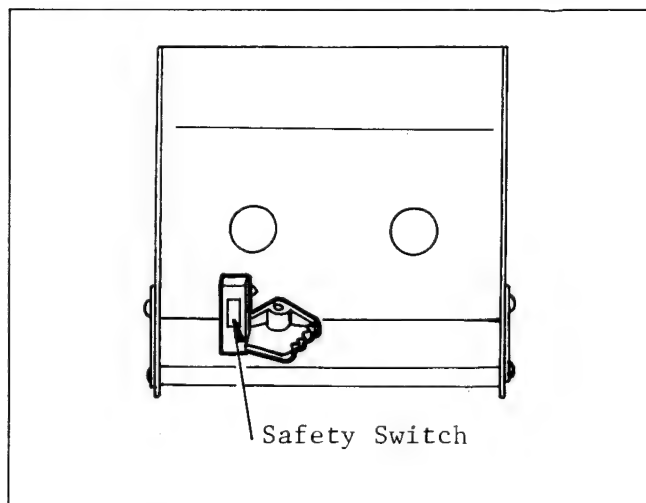


Fig. M17 Simulation of REC-PAUSE

2. Push the PAUSE button to simulate the REC-PAUSE mode.
3. Confirm that the clearance between the capstan shaft and pressure roller is within the specification.
4. If it is out of spec., adjust it by turning screw (A) to obtain the specified clearance.

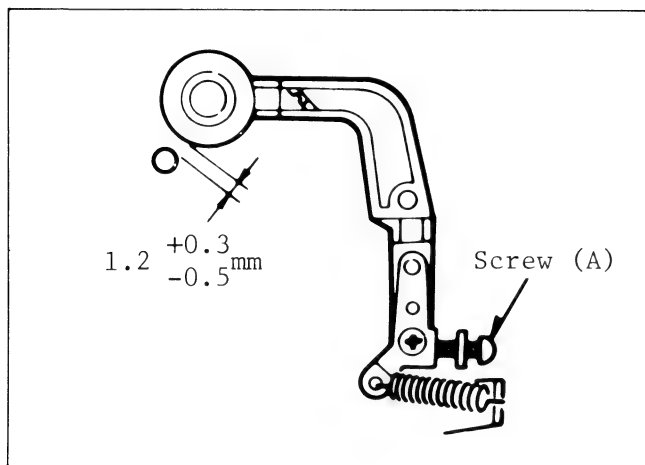


Fig. M18 Spec. of Clearance

B: Adjustment of Oil Seal

Specification: $0.8 \begin{smallmatrix} +0.1 \\ -0 \end{smallmatrix} \text{ mm}$

Set the distance between the Capstan Holder Unit and Oil Seal to the specified clearance.

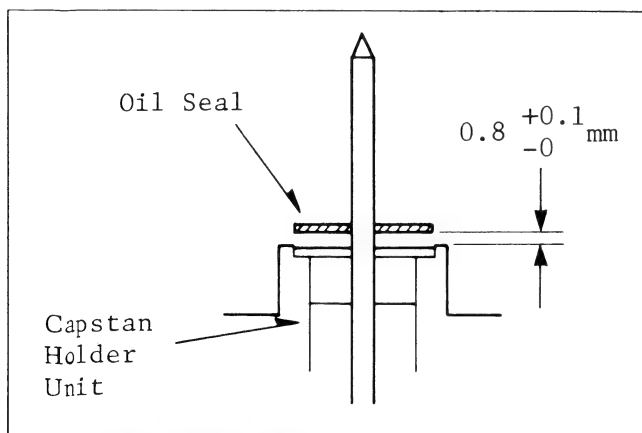


Fig. M19 Spec. of Clearance

6. CONFIRMATION OF TAPE SPEED

* Equipment Required:

Frequency Counter

VHS Alignment Tape, VFMS0001H6

1. Remove the Top Case, Front Panel, Bottom Plate and P.C. Boards (Bottom, Front, Potentiometer).
2. Connect the frequency counter to the output terminals of the capstan FG signal. (Connect one to TP2001 and the other to ground line.)

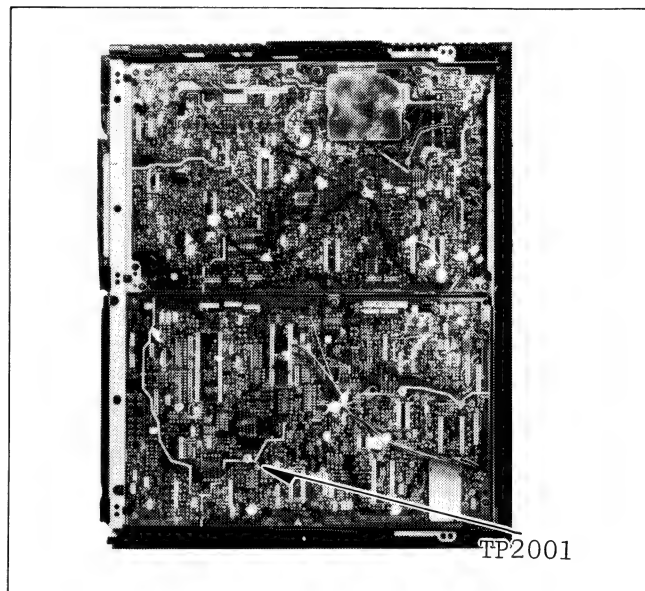


Fig. M20 Location of TP2001

3. Playback the monoscope portion of the alignment tape and wait until tape movement is well stabilized.
4. Read the frequency counter and confirm that it is within the specification.
5. If it is out of spec., use appropriate belt to obtain specified tape speed, note that 3 different capstan belts are available.

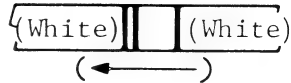


Part NO. of Belt	Mark on Belt (Rotating Direction)	Case of Use
VDVS0029A		Less than 1073.9 Hz
VDVS0029B		Within Spec. 1078.9 \pm 5Hz
VDVS0029C		More than 1083.9 Hz

Fig. M21 Indication on Belt

6. When replacing the Capstan Belt, first remove 2 screws (A), Thrust Holder, and the Fast Wind Belt. Then remove the Capstan Belt and install the appropriate belt.

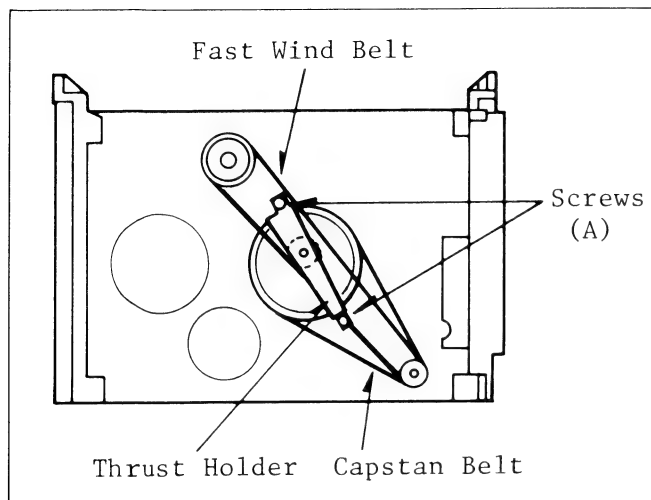


Fig. M22 Replacement of Capstan Belt

Notes:

1. Do not put any oil or grease on the belts or pulleys.
2. When installing a new capstan belt, make sure the group of two, three or four stripes is positioned in the direction of rotation of capstan motor pulley in PLAY mode and on outside.

7. POSITION ADJUSTMENT OF TENSION POST

* Equipment Required:

Tension Post Adjustment Plate
 (VFKS0002)
 Fine Adjustment Screwdriver
 (VFKS0021)

1. Turn Power ON and insert the tape. Confirm the TAPE IN DISPLAY is ON, then remove the Cassette Up Unit.

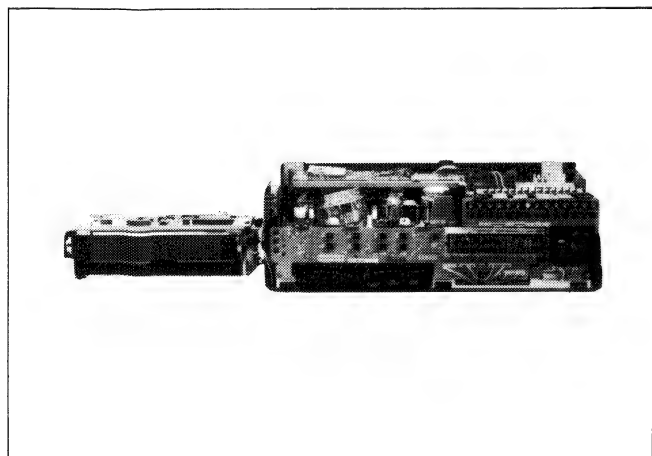


Fig. M23 Removal of the Cassette Up Unit

2. Push PLAY button to complete loading, then disconnect the AC plug.
3. Place the adjustment plate, slightly loosen screw securing the tension band bracket.
4. Insert the fine adjustment screwdriver into the hole and move the tension band bracket right or left so the tension post just touches the fixture.

Note:

Make sure that the TC link does not move when performing this adjustment.

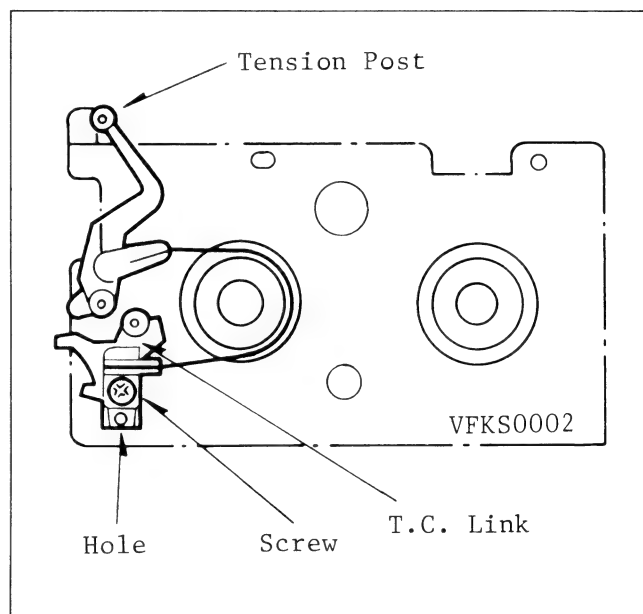


Fig. M24 Adj. of Tension Post

8. MEASUREMENT AND ADJUSTMENT OF BACK TENSION

A: Measurement Procedure

* Equipment Required:

Back Tension Meter (Tentelometer,
 Model T2-H7-UM, Purchase Locally)
 VHS Cassette Tape (120 Minute Tape)

* Specification: 27 ~ 32g

1. Pull the erase head in the direction indicated by the arrow and hold it with adhesive tape.
2. Play back the cassette tape from its beginning and wait until tape motion has stabilized. (for approx. 10 to 20 seconds)

3. Insert tension meter in tape path and confirm reading.
4. If the reading is out of spec., repeat the adjustment procedure.

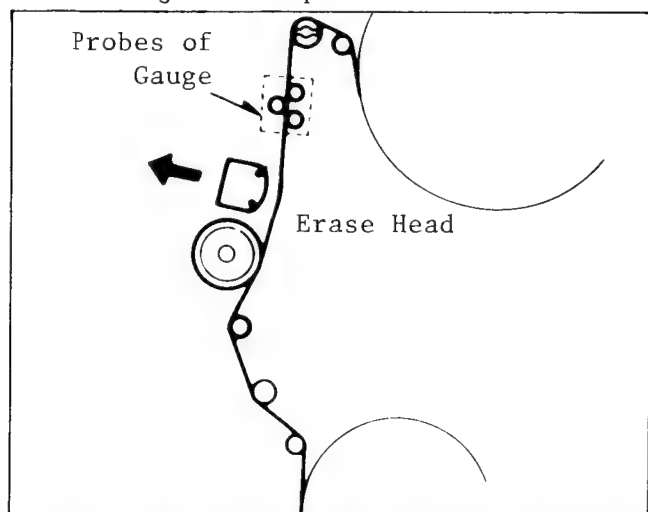


Fig. M25 Measurement of Back Tension

Note:

1. Make sure that the three probes of the meter are all in solid contact with tape, but out of contact with any other parts while measuring.
2. It is recommended that measurements be taken three times as tension meter is very sensitive.

B: Adjustment Procedure

* Equipment Required:

Fine Adjustment Screwdriver.... (VFK0136)

1. Loosen screw (A) and insert the fine adjustment screwdriver into the hole (B).
2. Move the adjustment plate either right or left as indicated by the arrow to obtain the specified tension.
Turn the driver clockwise to loosen tension, counterclockwise to tighten it.
3. Tighten screw (A) and verify tension with the meter once again.

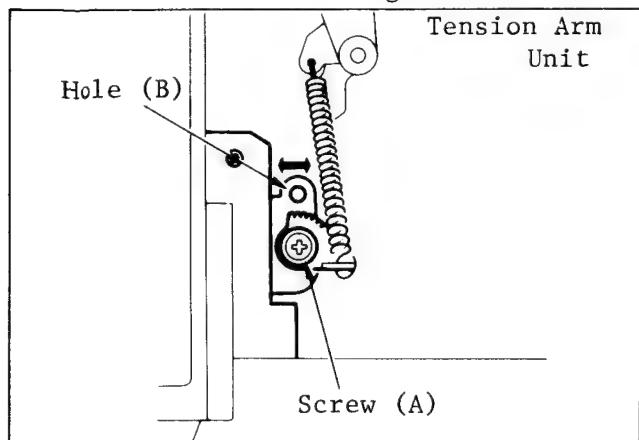


Fig. M26 Adj. of Back Tension

Note:

Upon completion of adjustment, remove the adhesive tape holding the erase head.

9. CONFIRMATION OF BRAKE TORQUE

A. Confirmation Procedure

* Equipment Required:

Dial Torque Gauge (VFK0133)

Adaptor for Gauge (VFK0134)

1. Turn power ON and insert the tape. Confirm the TAPE IN DISPLAY is ON, Then remove the Cassette Up Unit. Push FF button. Then disconnect the AC plug.

	B	A	A	B
	Supply Reel	Takeup Reel		
		A	B	
Takeup	More than	70 ~ 150 g-cm		
Supply	450 g-cm	95 ~ 195 g-cm		

Fig. M27 Spec. of Brake Torque

2. Attach the adaptor to the torque gauge
3. Place the torque gauge on the reel table. The weight of gauge should not rest on the reel table.

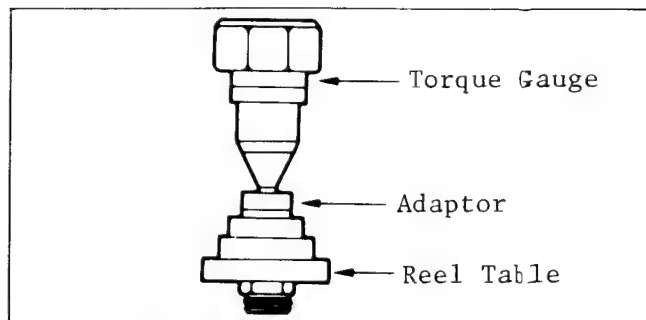


Fig. M28 Measuring Method

4. Turn torque gauge in the direction indicated as A or B until the brake begins slipping. Read the torque when it begins slipping.

Note:

If proper brake torque can not be obtained, clean the rotating surface of reel table with a soft cloth and recheck torque before replacing brakes.

10. CONFIRMATION OF TAKEUP TORQUE

* Equipment Required:

Dial Torque Gauge (VFK0133)
Adaptor for Gauge (VFK0134)

* Specifications:

in PLAY mode 120 ~ 190g-cm
in FF and REWIND mode
..... More than 400g-cm

1. Attach the adaptor to the torque gauge.
2. Turn power ON and insert the tape. Confirm the TAPE IN DISPLAY is ON, then remove the Cassette Up Unit. Connect a jumper from TP2006 to TP6002.
3. Set torque gauge to the Takeup Reel Table, push the play button and read torque on gauge. Also check torque on FF mode by pushing the FF button.

Note:

While measuring, the weight of gauge should not rest on the reel table.

4. Set torque gauge to the Supply Reel Table, press the rewind button for confirmation of the rewind mode.
5. Remove the jumper.

Note:

If the torque readings are off considerably, rollers or reel tables or drive belt may need replacement.

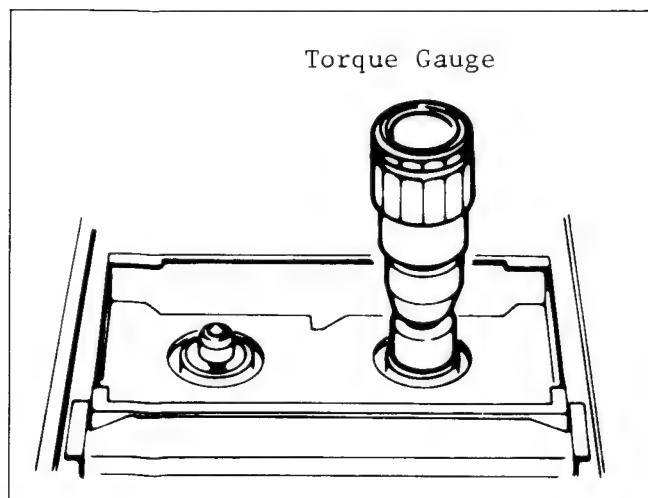


Fig. M29 Measuring Method

11. POSITION ADJUSTMENT OF SAFETY SWITCH

This adjustment is required only when the Safety Switch has been replaced or mounting screw has been loosened.

* Equipment Required:

Cassette Holder Fixture
..... (VFKS0004)
Fine Adjustment Screwdriver
..... (VFK0136)

1. Remove the Top Case, Front Panel, Shield Case, Cassette Up Unit.
2. Place the fixture in place over the reel tables, and slightly loosen screw (A).
3. Insert the adjustment screwdriver into hole (B). Turn screwdriver counter clockwise and then slowly turn clockwise until switch turns on (it clicks). Tighten screw (A).

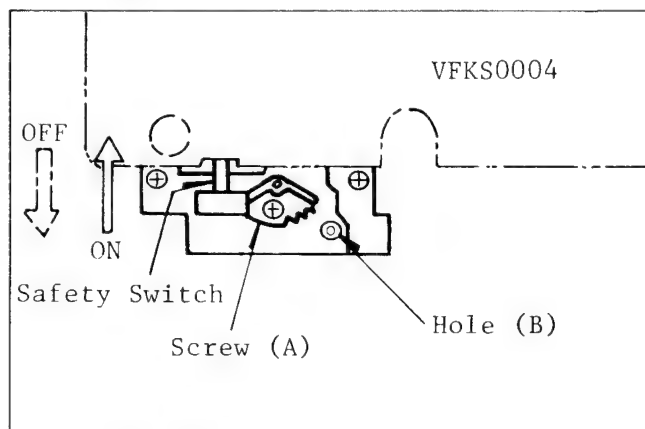


Fig. M30 Adj. of Safety SW.

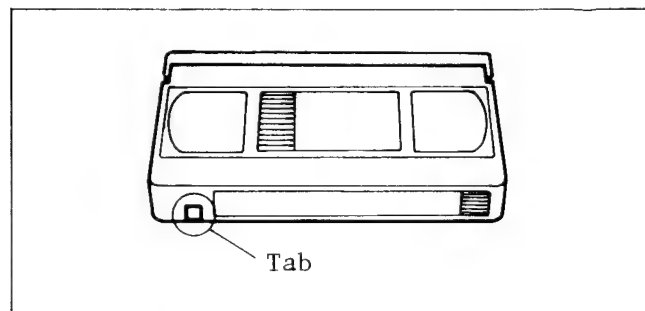


Fig. M31 Safety Tab on Cassette

Note:

Confirm that the Safety Switch correctly turns ON and OFF using video cassettes with and without the safety tab removed.

12. HEIGHT ADJUSTMENT OF REEL TABLES

* Equipment Required:

Post Adjustment Plate (VFKS0010)
Reel Table Height Fixture

..... (VFKS0009)

* Specification $0 \pm 0.1\text{mm}$

1. Remove the Cassette Up Unit.
2. Place the post adjustment plate over the reels, and put the fixture on it. Set the fixture to zero "0" making sure that the scraper of fixture touches the cut-out portion of the plate.

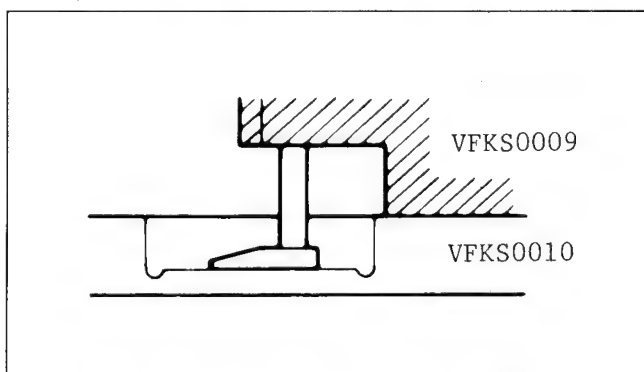


Fig. M32 Adj. of Reel Table Height - (1)

3. Then measure the top portion of reel table and confirm the difference against the condition just performed in former step. Do same for the other reel table.

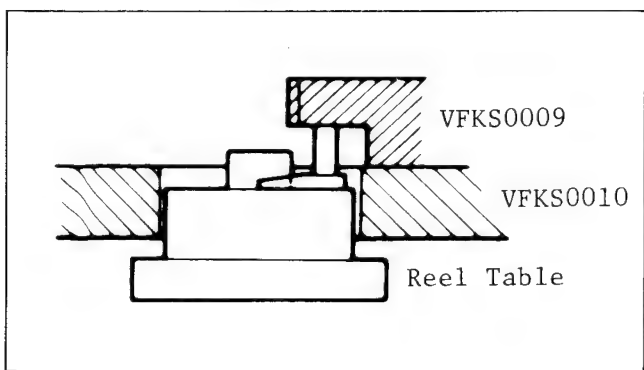


Fig. M33 Adj. of Reel Table Height - (2)

4. If the difference is more than 0.1mm (higher or lower), adjust the height of reel table to obtain the specified height.
5. For adjustment, change the poly slider washer located under the reel table. (The washer is available in sizes of varying thicknesses, $t=0.13\text{mm}$, 0.25mm and 0.5mm .)

13. HEIGHT ADJUSTMENT OF TAPE GUIDE POSTS (ROUGH ADJUSTMENT)

* Equipment Required:

Hex. Wrench, 0.9mm (VFK0146)

Post Adjustment Plate ... (VFKS0010)

Reel Table Height Fixture

..... (VFKS0009)

Nut Driver (Purchase Locally)

Post Adjustment Screwdriver

..... (VFK0137)

1. Remove the cassette up unit and install the adjustment plate.

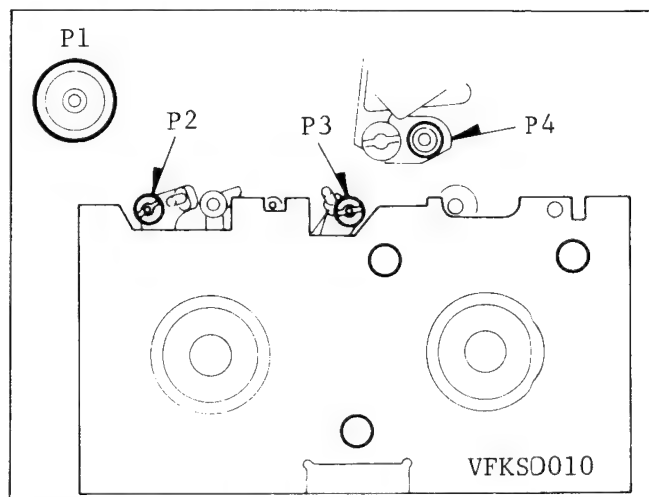


Fig. M34 Adj. of Tape Guide Post Height - (1)

Loosen lock screw located at lower portion of posts (P2 & P3), then turn the posts with post adjustment screwdriver.

2. Lower all posts so the condition of height becomes as shown. (Lower end of post and tape guide should be lower than scraper.)

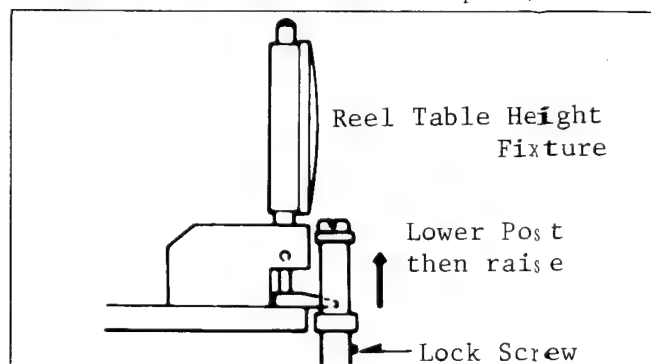


Fig. M35 Adj. of Tape Guide Post Height - (2)

Note: Normally P1 and P4 will not need adjustment unless they have been replaced.

- Place the fixture on the adjustment plate and fit the scraper to the post. The fit exactly scraper should as shown. (The scraper of the fixture should be fully lowered till it touches plate.)

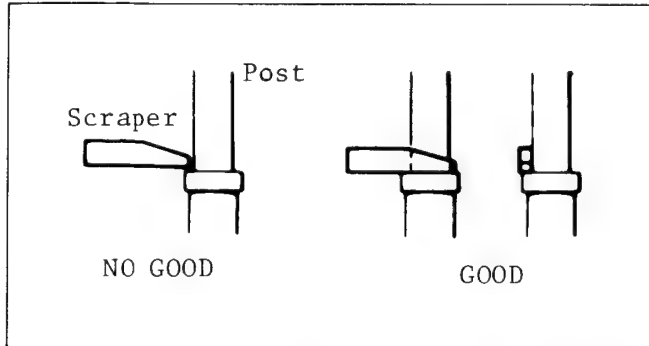


Fig. M36 Adj. of Tape Guide Post Height - (3)

- Set the fixture to zero "0" and slowly raise the post until it just touches the scraper. For adjustment of P1 and P4, use the nut driver. (The post cap on P4 can be removed by turning counterclockwise.) For adjustment of P2 and P3, use the post adjustment screwdriver.

Note:

Upon completion of adjustment, tighten lock screws on the P2 and P3 and also install the post cap on post 4. When the post cap on P4 is reinstalled, the position of it should be as shown below when viewed from the direction indicated by the arrow.

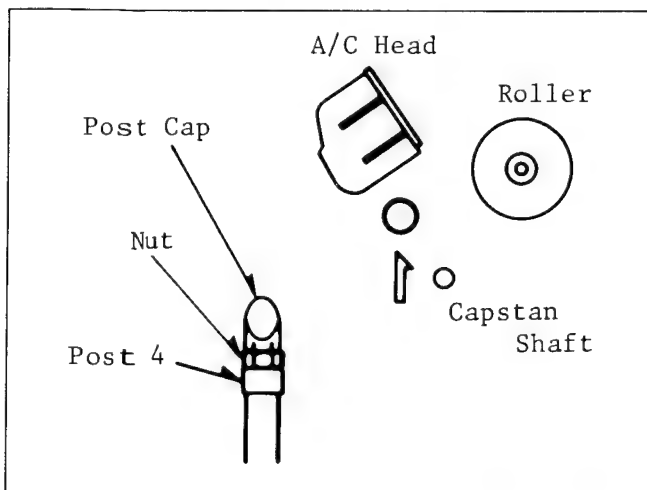


Fig. M37 Installation of Post Cap

14. TAPE INTERCHANGEABILITY ADJUSTMENT (FINAL ADJUSTMENT)

Note:

To perform these adjustment/confirmation procedures, make sure that the tracking control is set in the detent (fixed) position.

*** Equipment Required:**

Alignment Tape, (VFMS0001H6)

Post adjustment Screwdriver

..... (VFK0137)

H-Position Adjustment Screwdriver

..... (VFKS0003)

Hex. Wrench, 0.9mm .. (VFK0146)

Hex. Wrench, 1.5mm .. (VFK76)

Oscilloscope

Nut Driver

(Purchase from local supplier), 7.0mm

14-A. CONFIRMATION OF TAPE TRAVEL

To prevent the alignment tape from being damaged, use a normal cassette tape for confirmation.

- Playback a cassette tape and confirm that tape travels without curling at the edges.

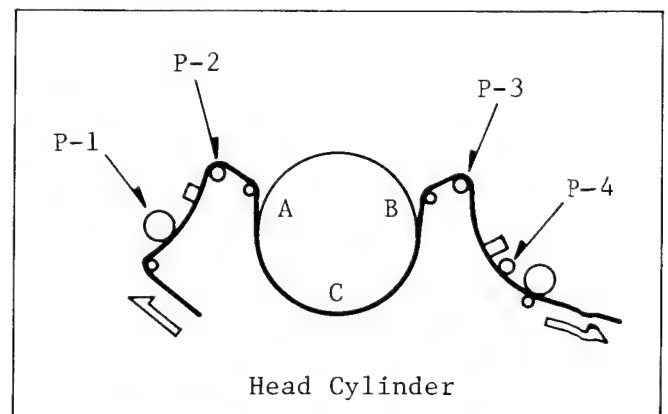


Fig. M38 Location of Posts

2. If curling is apparent, slightly adjust the height of posts by turning the top of post with the post adjustment screwdriver (for P2 & P3) or nut driver (for P1 & P4). Before turning the posts, slightly loosen the lock screws and upon completion, retighten them up.

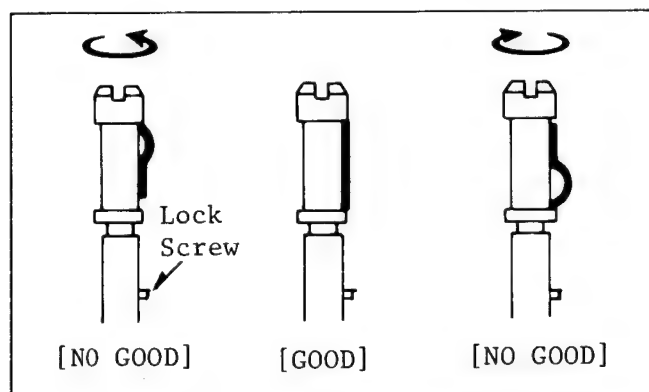


Fig. M39 Confirmation of Tape Travel

14-B. CONFIRMATION OF A/C HEAD HEIGHT

This confirmation is required when the A/C Head was replaced and for preliminary height adjustment. For final adjustments, perform item 14-C, 14-D, this page.

1. Looking at the lower edge of the control head with the tape running, ensure that the lower edge of tape runs along the lower edge of the control head.
2. If it doesn't, slightly turn nut (A) in one of directions to correct it. Turn it clockwise to lower the head, counterclockwise to raise it.

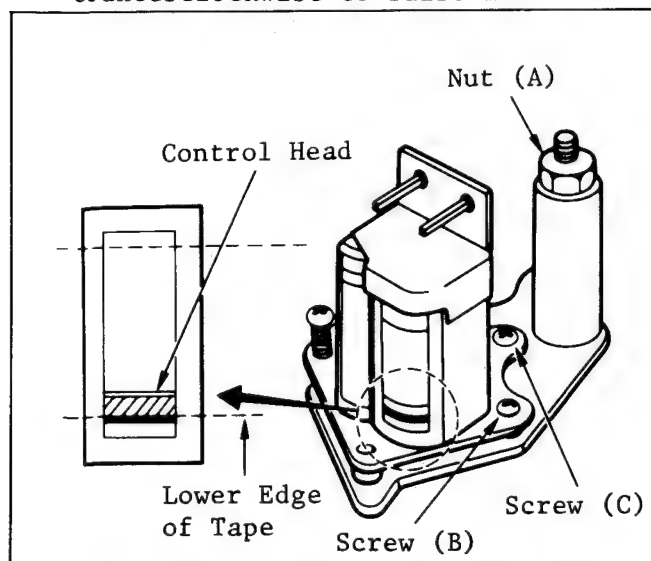


Fig. M40 Confirmation of A/C Head Height

14-C. CONFIRMATION OF TILT OF A/C HEAD

This procedure should be performed after the height adjustment of P4.

1. Playback the tape and confirm that the tape runs between lower and upper limiters of post. Also confirm that the tape is running smoothly.
2. If adjustment is required, turn clockwise the screw (C) until curling is apparent at lower edge of P4. Then turn the screw (C) counterclockwise until the curling is smoothed out.

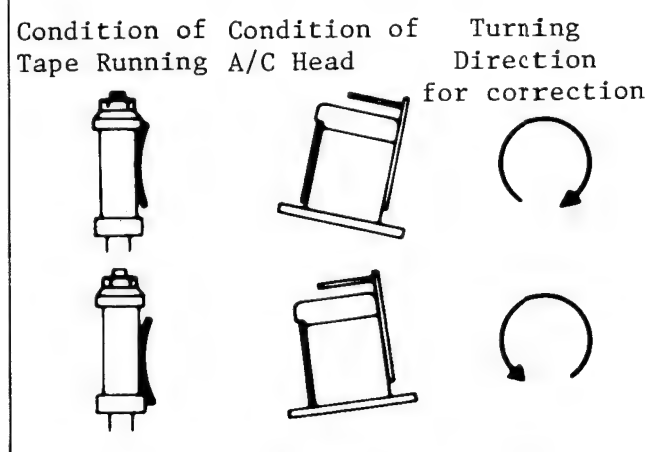


Fig. M41 Confirmation of A/C Head Tilt

14-D. HEIGHT AND AZIMUTH ADJUSTMENT OF AC/HEAD

1. Connect the oscilloscope to the audio output jack on the rear of the deck.
2. Playback the monoscope portion (6kHz, Audio) of the alignment tape, VFMS0001H6.
3. Adjust the height by turning screw (B) indicated in Fig. M40 for the maximum output level. Slowly and gently turn screw (B) for this adjustment.

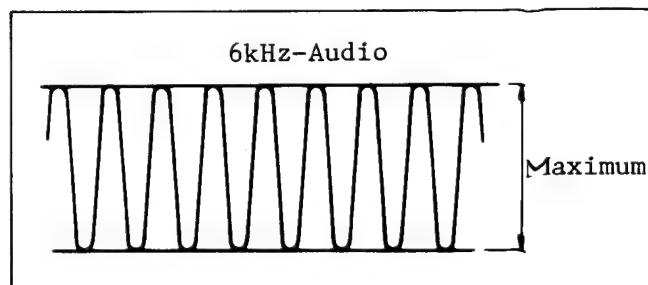


Fig. M42 Adj. of A/C Head Height

4. Readjust nut (A) for maximum output.

14-E. HORIZONTAL POSITION ADJUSTMENT OF A/C HEAD

1. Set the tracking control to the detent (fixed) portion. Connect the oscilloscope to Test Point (TP3504). Use TP2008 as a trigger.

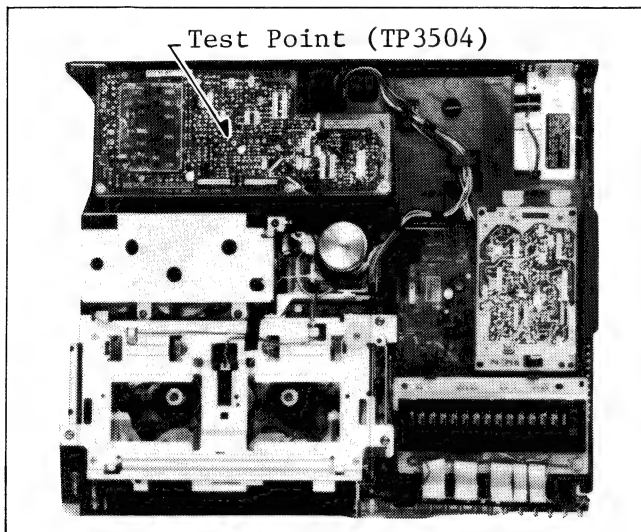


Fig. M43 Horizontal Position Adjustment of A/C Head

2. Insert an H-position Adjustment screwdriver into the Adjustment Nut and loosen the Nut until A/C Head Base touches the Nut at the lowest portion of slope of the Nut as show in Fig. M44.

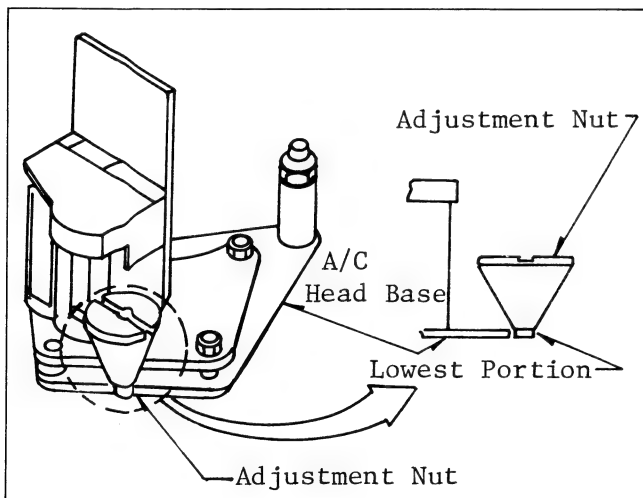


Fig. M44 Horizontal Position Adjustment of A/C Head-(1)

3. Playback the monoscope portion (6kHz, Monaural) of the alignment Tape (VFMS 0001H6).
4. Slowly turn the Adjustment Nut clockwise just until the envelope output at TP3504 is maximized.

Best Adjustment Position:

The envelope output level at TP3504 while turning the Adjustment Nut is shown in Fig. M45.

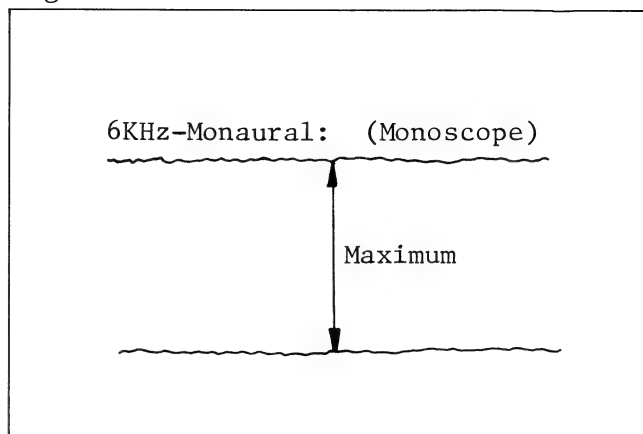


Fig. M45 Horizontal Position Adjustment of A/C Head-(2)

Best Adjustment position is Ⓐ portion of Fig. M46.

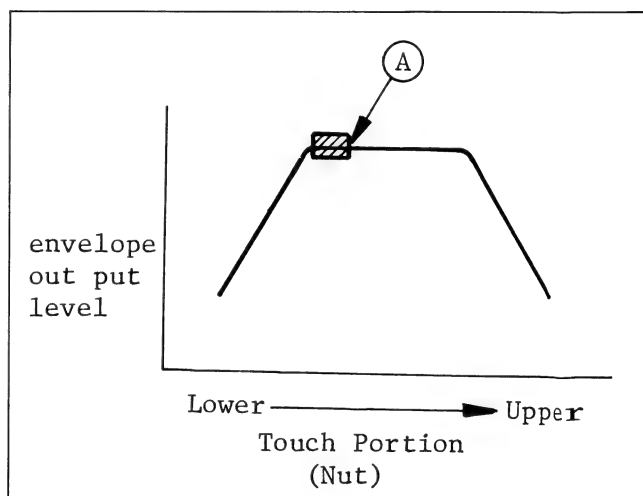


Fig. M46 Horizontal Position Adjustment of A/C Head-(3)

5. Following confirmation is necessary for the best adjustment.
 - a) Both envelope outputs of R CH and L CH are attenuated similarly when Tracking VR on Front Panel is turned clockwise.
 - b) The envelope output of R CH is attenuated faster than the envelope output of L CH when Tracking VR on Front panel is turned counterclockwise.
 - c) The envelope output of L CH is about 1/2 ~ 1/3 of maximum envelope output when Tracking VR on Front panel is fully turned counter clockwise.

14-F. CONFIRMATION/ADJUSTMENT OF ENVELOPE OUTPUT

Set the tracking control to the detent (fixed) portion.

1. Connect the oscilloscope to the Test Point, TP3504. Use TP2008 as a trigger.
2. Playback the monoscope portion of the alignment tape VFMS0001H6 and watching the scope display adjust the height of posts P2 and P3 by so the envelope figure becomes as flat as possible.
($V1/V\text{-max} \geq 0.7$, $V2/V\text{-max} \geq 0.8$)
If adjustment is required, turn top of post with post adjustment screwdriver. For adjustment of P2 & P3, refer to step 2 of item 14-A.

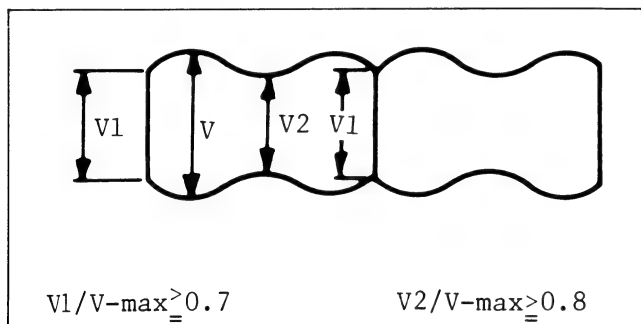


Fig. M47 Spec. of Envelope Figure - (1)

3. When the scope display is as follows, adjust the height of P2 so that the waveform looks like Fig. M50.

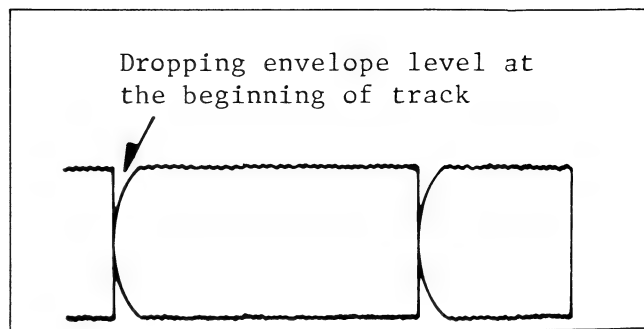


Fig. M48 Envelope Figure - (2)

4. When the scope display is as follows, adjust the height of P3 so that the waveform looks like Fig. M50.

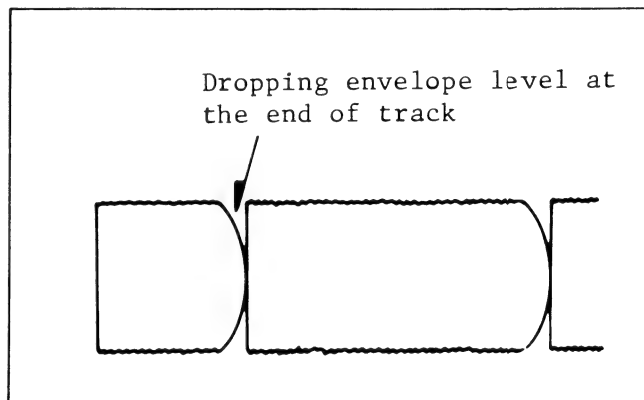


Fig. M49 Envelope Figure - (3)

5. The scope display when P2 and P3 are adjusted correctly should appear as shown below.

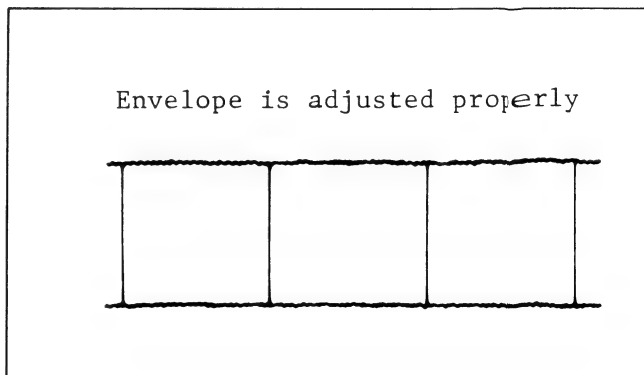


Fig. M50 Envelope Figure - (4)

15. ADJUSTMENT OF V-STOPPERS

Equipment Required:

V-Stopper Adjustment

Fixture VFKS0029

1. Remove the D.D. Cylinder Unit from chassis. (Removal of Upper Cylinder Unit is not required.) Refer to "REPLACEMENT OF D.D. CYLINDER UNIT" section.
2. Keeping 4 screws (A) loose, set the fixture. Push the V-stoppers snugly against the pins and tighten 4 screws (A).

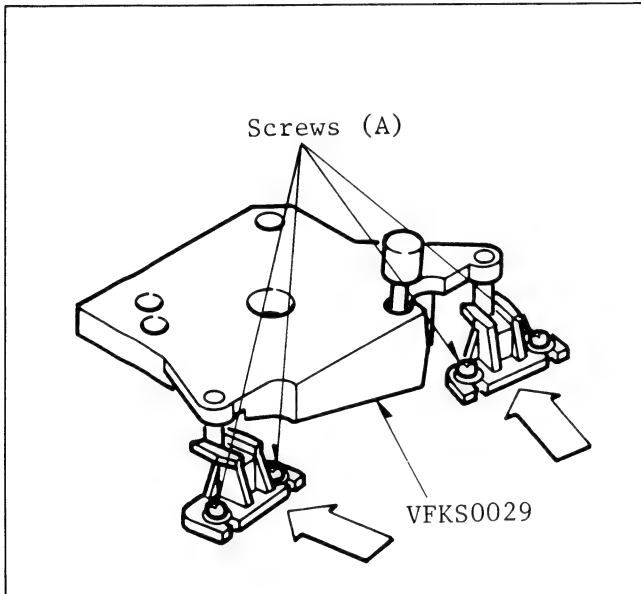


Fig. M51 Adjustment of V-Stoppers

3. Upon completion of the adjustment, simulate loading completion to ensure that posts smoothly fit the V-stoppers. Then reinstall the D.D. Cylinder Unit.

16. ADJUSTMENT OF CAM GEAR AND MODE SELECT SWITCH

General Condition:

The mechanism of this model is mostly engaged to the electrical circuit, System Control Circuit, through the mode select switch. Therefore the relation between the mode switch and the cam gear determines all further mechanical movement of the mechanical parts such as levers, gears, rollers and so on. If the adjustment of this item is performed improperly, the deck will be unloaded or automatically stopped. It will also result in damage to mechanical and electrical parts.

Note:

The Step 9 of this procedure describes the necessary adjustment if the mode select switch is replaced.

Adjustment Procedures:

1. Turn loading gear clockwise until post 2 and 3 are fully unloaded. The small projection on the loading gear will be pointing up in the unloaded condition.

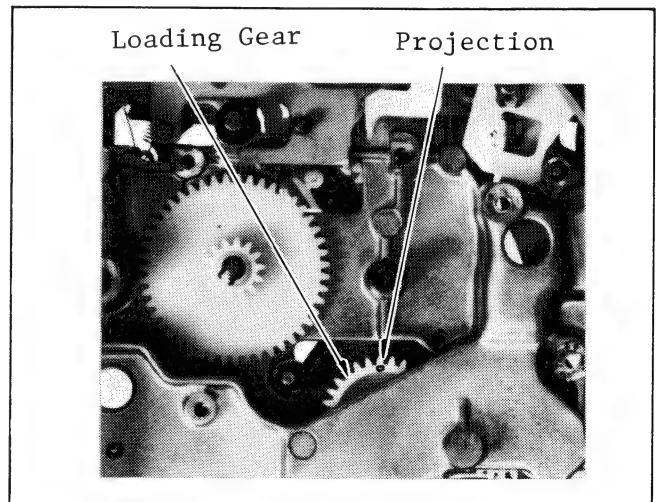


Fig. M52 Adj. Procedure - (1)

2. Install the action gear so the hole on the action gear meets the projection on the loading gear. Ensure that the loading gear is still in the fully unloaded condition
3. Slowly slide the main rod so it's V-shaped mark meets the V-shaped mark of the mode select switch. This will simulate stop mode (unloading completion) of main rod and mode select switch.
4. Insert the cam gear so hole (A) on the gear meets the hole on the main rod. To facilitate matching the two holes, use the small hex. wrench or a metal pin. Also ensure that the two V-shaped marks are matched and that the simple slot side of the cam gear is showing.

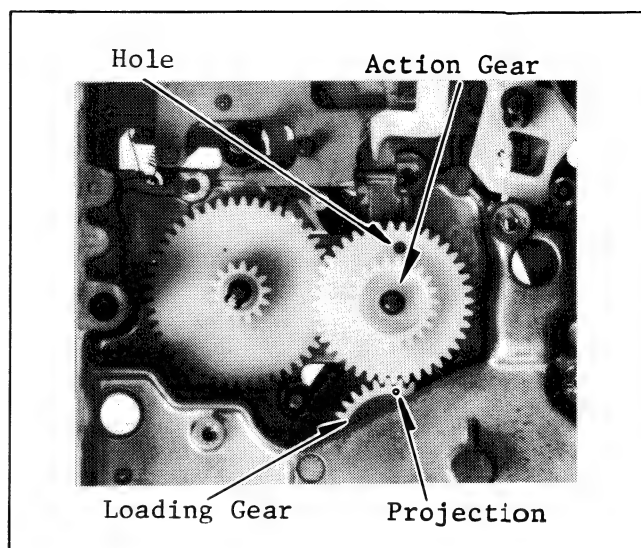


Fig. M53 Adj. Procedure - (2)

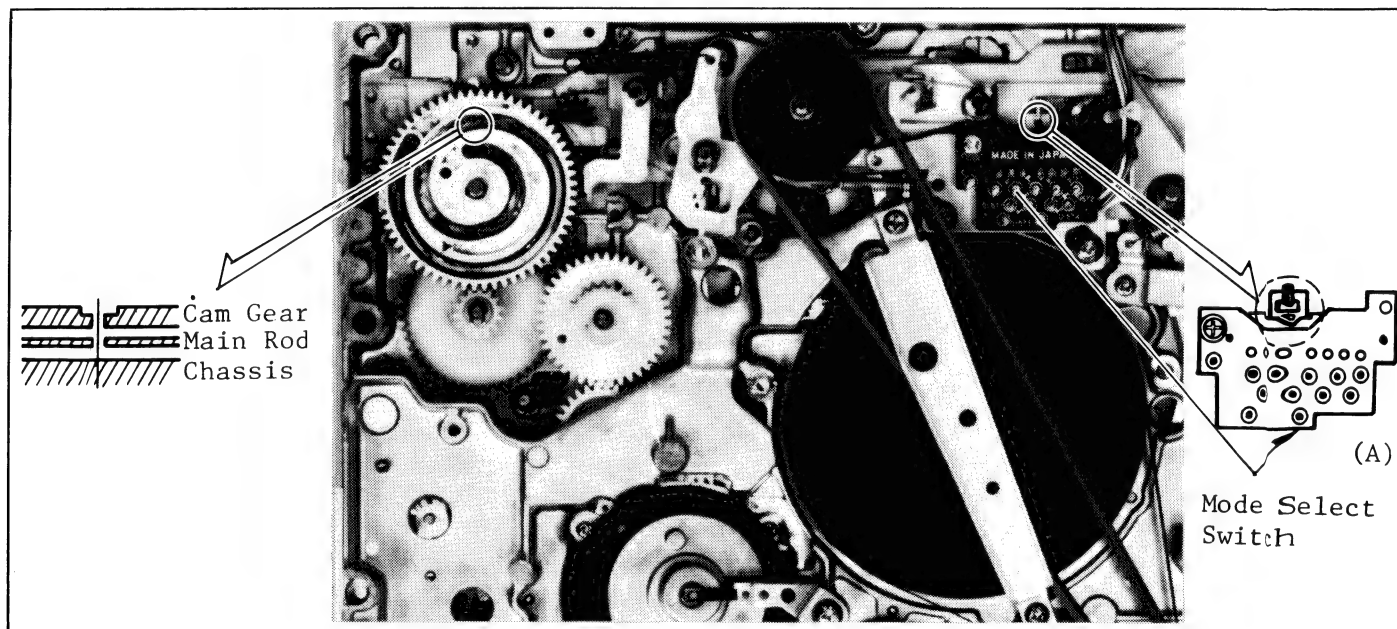


Fig. M54 Adj. Procedure - (3)

5. Install the sector gear so the pin on the sector gear meets the inner slot of the cam gear (simple slot side). Also install retaining ring in order to mount sector gear.

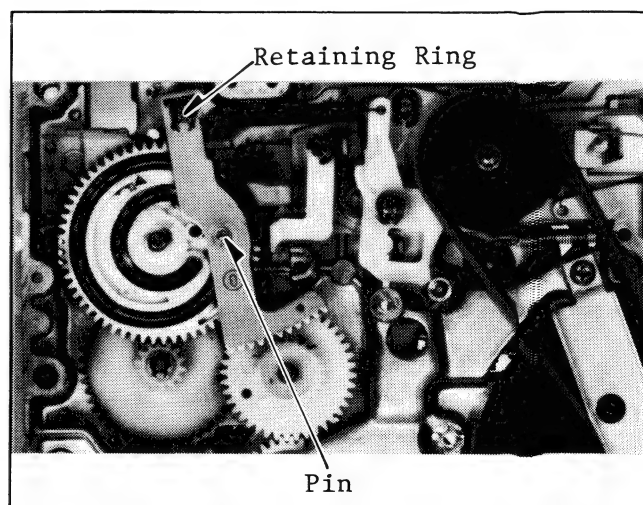


Fig. M55 Adj. Procedure - (4)

6. Completed adjustments should appear as illustrated below, and the two V-shaped marks should be matched at the mode select switch.

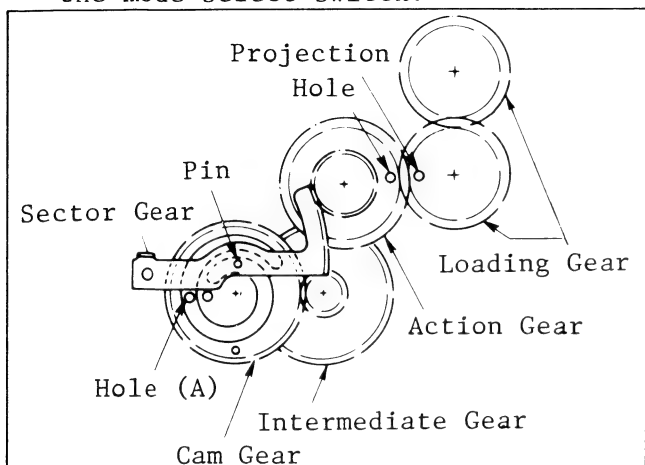


Fig. M56 Adj. Procedure - (5)

7. Install the gear protector and tighten the nut for mounting action gear, and install the E-Ring to mount cam gear. Also install the large Pulley so that teeth it's contact the outer teeth of the intermediate gear. Then install a retaining ring to mount it.

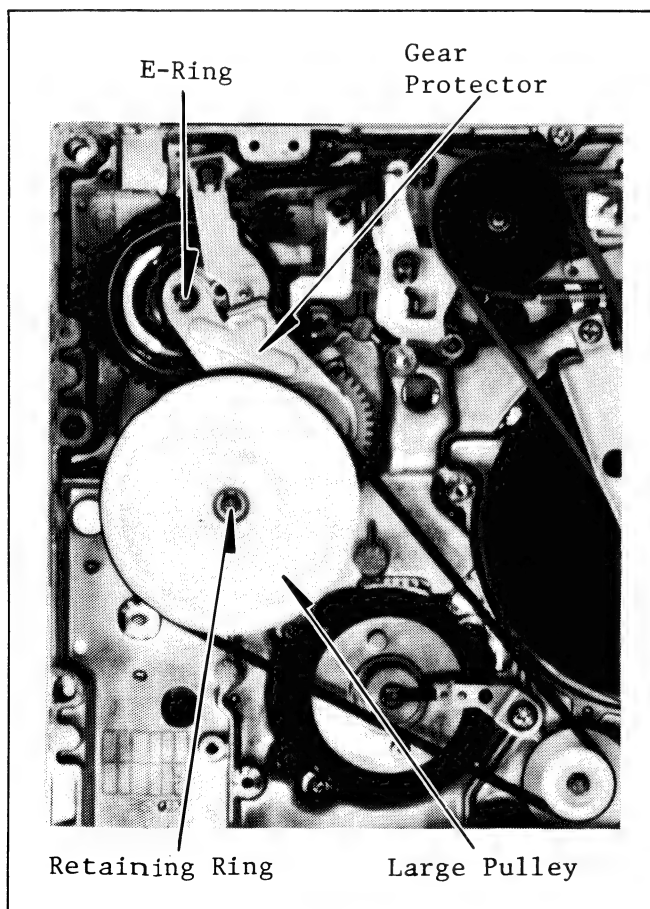


Fig. M57 Adj. Procedure - (6)

8. Install the loading belt. Turn the large pulley in both directions to confirm smooth movement of this mechanism.
9. (Adjustment of Mode Select Switch)
Fix the main rod in the unloading completion condition, match the V-shaped notches of the switch and the tab on the main rod, then tighten 2 screws (C).
Upon completion, ensure that the movement of the deck is normal.

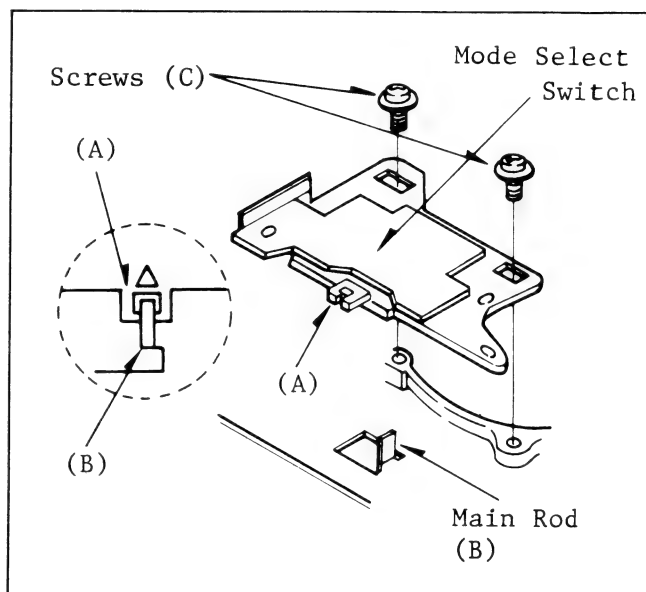


Fig. M58 Adj. of Mode select Sw.

17. ADJUSTMENT OF CASSETTE UP GEARS

1. Remove the Cassette up unit according to removal Procedure of cassette up unit.
2. Set Cassette up unit in full cassette down condition.
Full cassette down condition:
 - a) Turn the cassette loading Motor by hand to the cassette down condition.
 - b) Then remove the worm wheel Unit and confirm that the Slide Lever (R) is in full down condition as shown in Fig. M59.

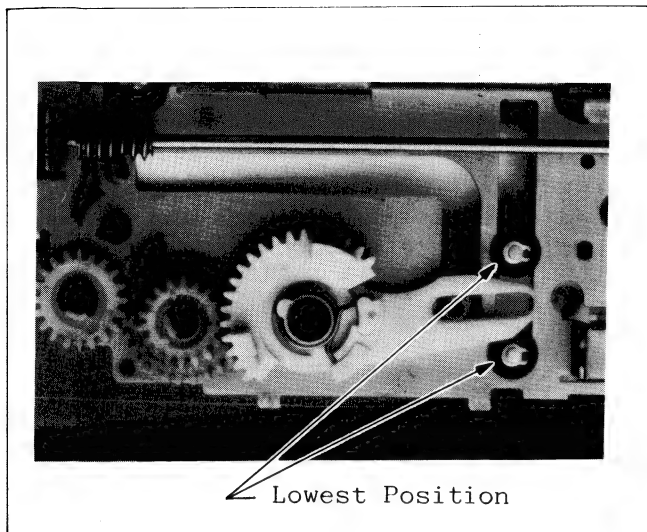


Fig. M59 Cassette Down Condition

Note:

All the following procedures for adjustment and part replacement should be performed with cassette up unit in full cassette down condition.

17-A RIGHT SIDE GEARS

1. Install the Intermediate Gear, then install the E-Ring.

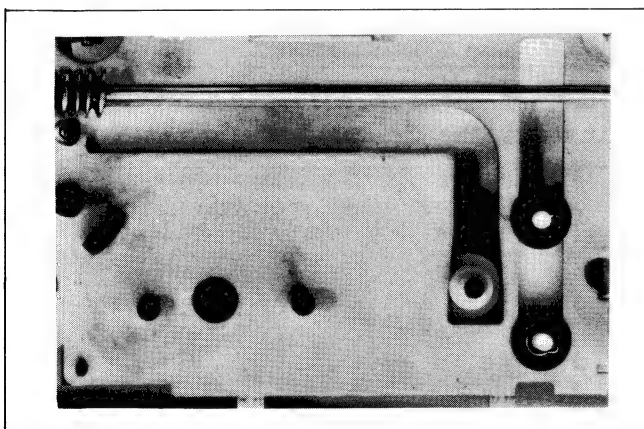


Fig. M60 Adj. of Cassette Up Gears - (1)

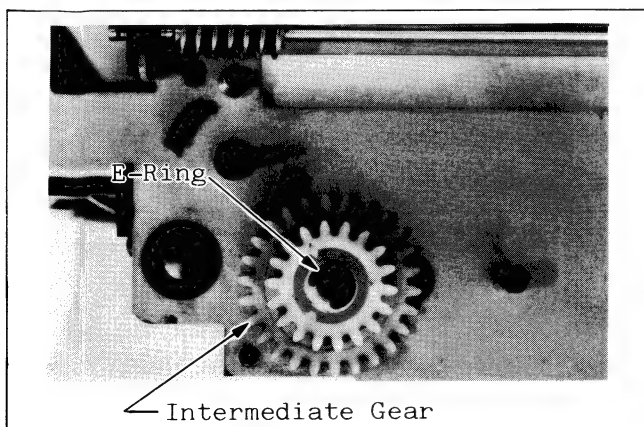


Fig. M61 Adj. of Cassette Up Gears - (2)

2. Install the wiper Gear (R) unit so that the upper edge of projection (A) on the wiper Gear (R) unit and the symbol on the Intermediate Gear are aligned. Then insert a washer and install the E-Ring.

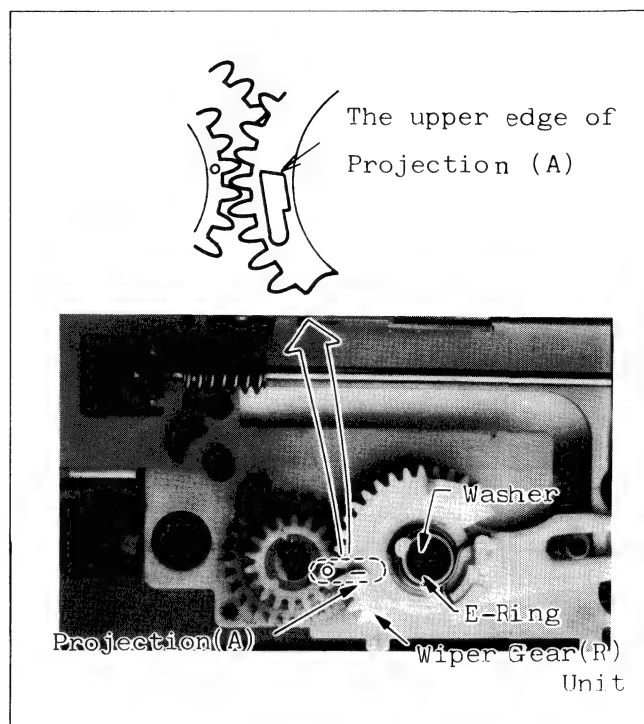


Fig. M62 Adj. of Cassette Up Gears - (3)

3. Install the Main Shaft Gear so that the symbol on the Main shaft Gear meet the symbol on the Intermediate Gear. Then install the E-Ring.

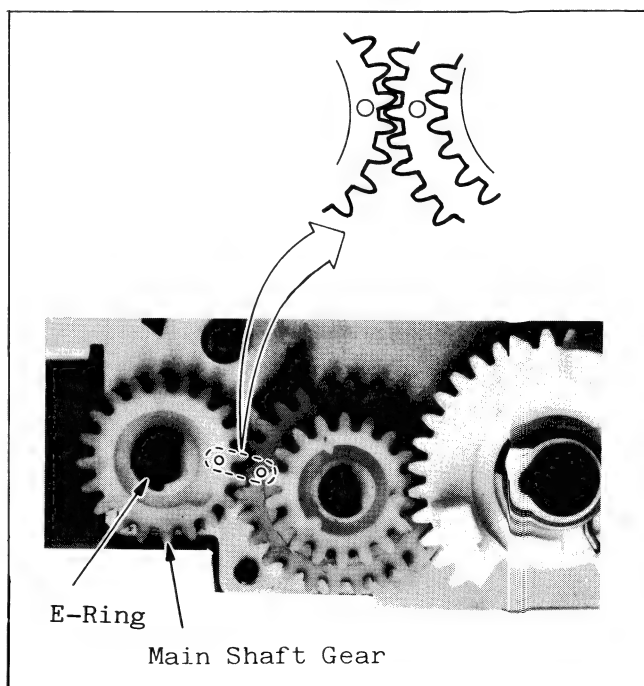


Fig. M63 Adj. of Cassette Up Gears - (4)

4. Install the worm wheel unit so that the projection on the worm wheel unit and center of main shaft are aligned on a straight line. Then insert a washer and install the E-Ring.

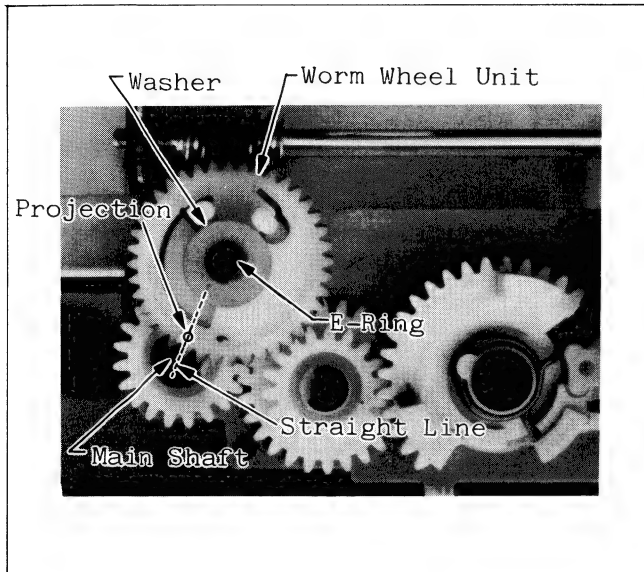


Fig. M64 Adj. of Cassette Up Gears - (5)

Note:

Before installing the worm wheel unit the stopper ring in the worm wheel unit should be adjusted as shown in Fig. M65.

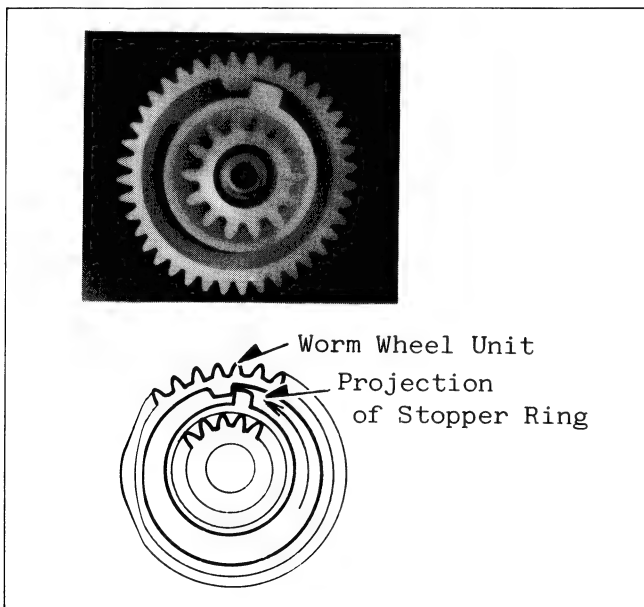


Fig. M65 Adj. of Cassette Up Gears - (6)

5. After adjustment of right side Gears, confirm that there are 4 gear teeth between projection (A) and the lower edge of hole (B) of worm wheel unit, when in full cassette up condition. If proper clearance can not be obtained, readjust the ring stopper in worm wheel unit, referring to item 4.

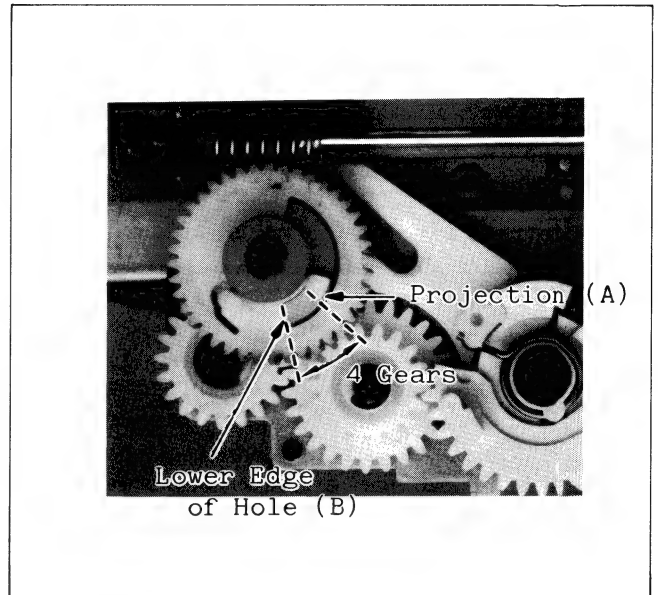


Fig. M66 Adj. of Cassette Up Gears - (7)

17-B LEFT SIDE GEARS

1. Install the Intermediate Gear, then install the E-Ring.

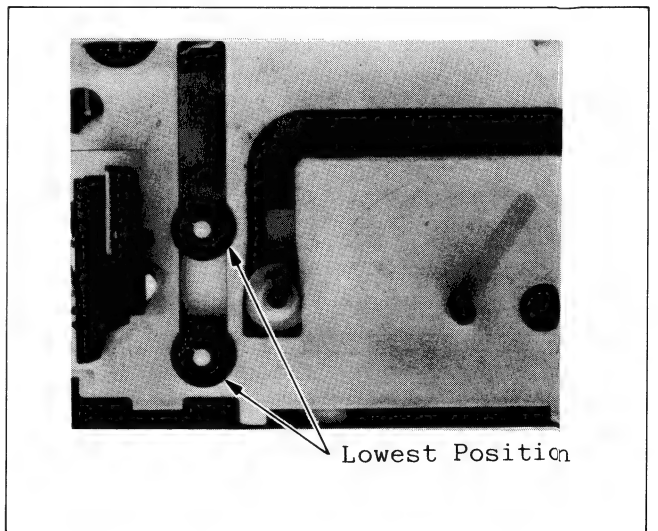


Fig. M67 Adj. of Cassette Up Gears - (8)

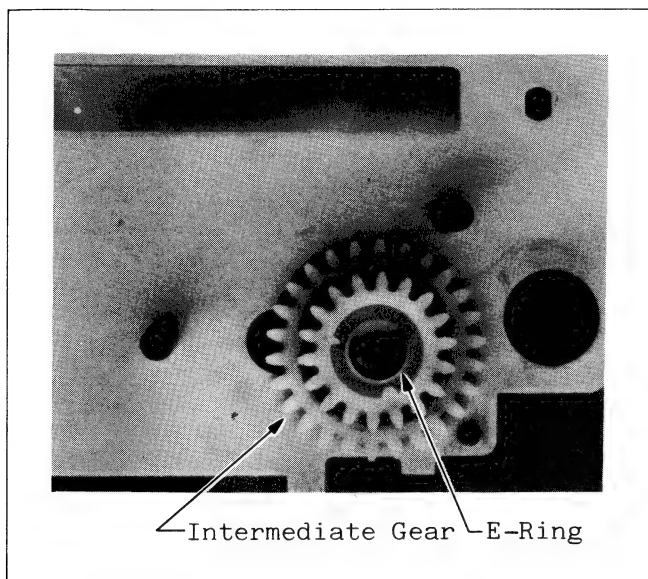


Fig. M68 Adj. of Cassette Up Gears - (9)

2. Install the wiper Gear (L) unit so that the projection on the wiper Gear (L) unit meets the triangle mark on the Intermediate Gear. Then install the E-Ring.

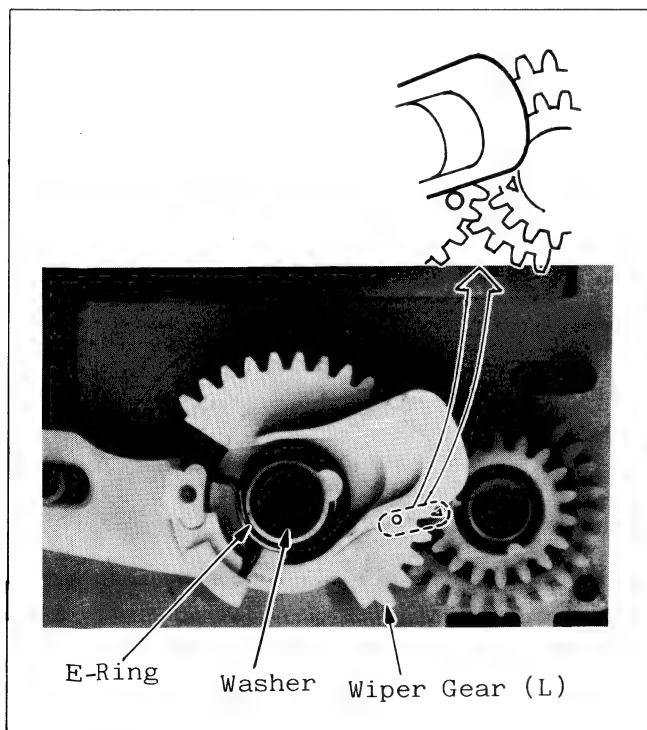


Fig. M69 Adj. of Cassette Up Gears - (10)

3. Install the Main shaft Gear so that the symbol on the Main shaft Gear meets the triangle mark on the Intermediate Gear. Then install the E-ring.

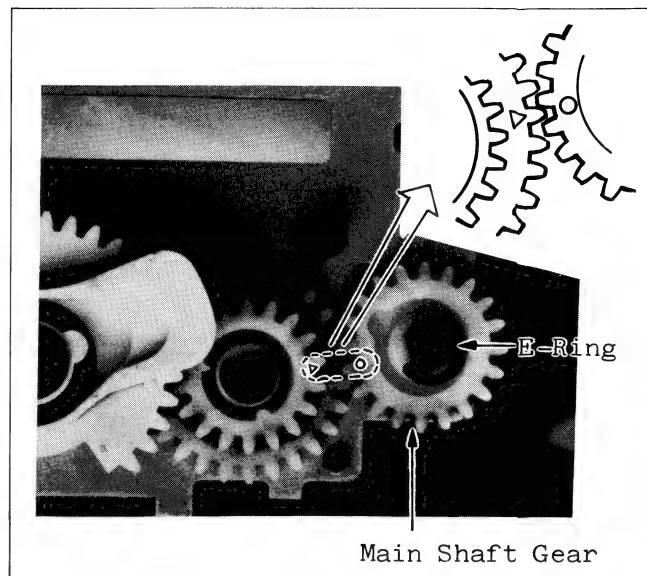


Fig. M70 Adj. of Cassette Up Gears - (11)

4. Install the cassette compartment opener Lever as shown in Fig. M71. Then install the E-Ring.

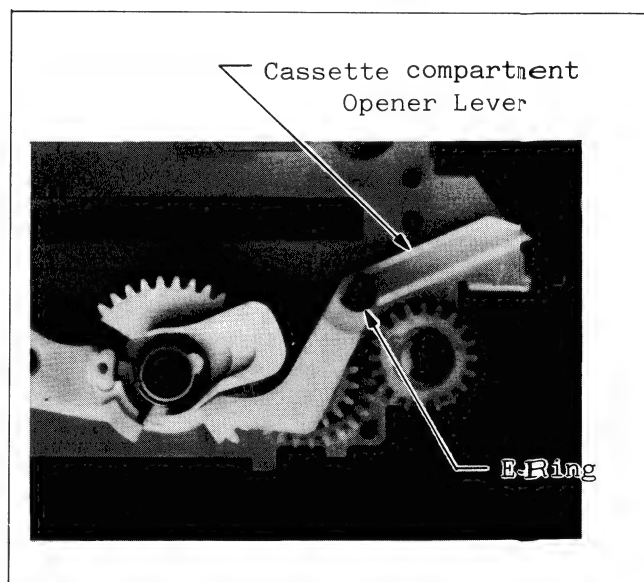


Fig. M71 Adj. of Cassette Up Gears - (12)

18. ADJUSTMENT OF CASSETTE UP SWITCH

*Equipment Required:

Fine Adjustment screwdriver ... VFK0136

1. Confirm that the cassette up unit is in the full cassette up condition and then remove the cassette up unit referring to removal procedure of cassette up unit.
2. Slightly loosen the Screw (A) and insert the adjustment screwdriver to the hole (B).
3. Insert thickness gauge (0.7 mm) between cassette up switch and the projection (C) of Wiper Gear (R) unit. Then adjust the cassette up switch to the on position, and tighten screw (A).
4. Confirm that the clearance between cassette up switch and the projection (C) of Wiper Gear (R) unit is 0.5 ~ 0.9 mm when the lever of cassette up switch is lifted up by hand.
5. Solder two terminals of cassette up switch on to P.C.B.

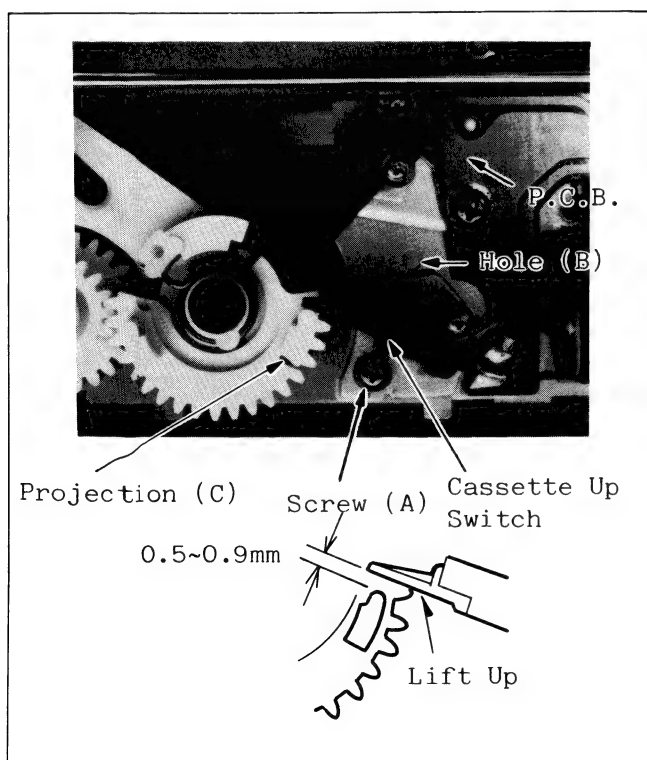

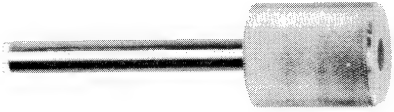

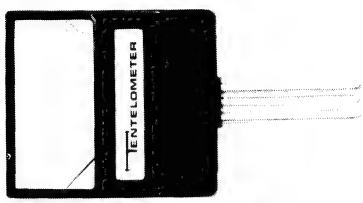
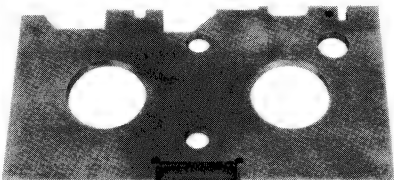
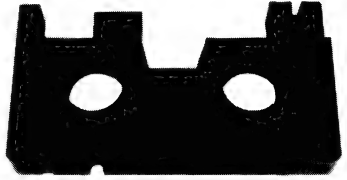
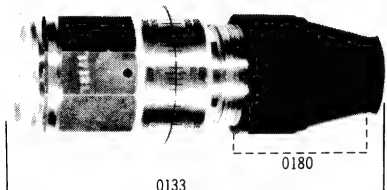
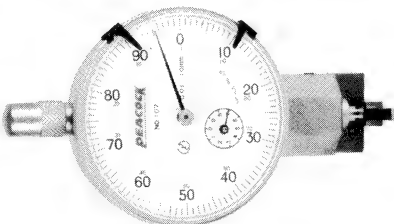
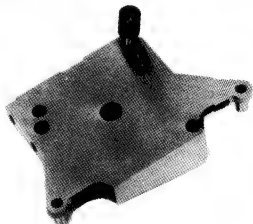
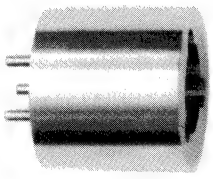
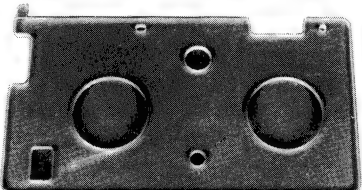

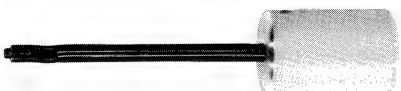
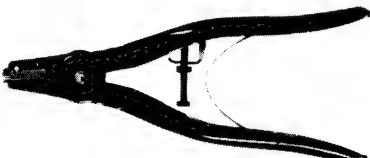



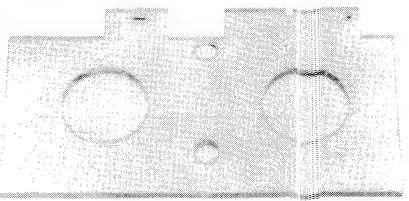


Fig. M72 Adj. of Cassette Up Gears - (13)

Servicing Fixtures & Tools

<p>VFMS0001H6 VHS Alignment Tape</p> 	<p>VFK0137 Post Adjustment Screwdriver</p> 	<p>VFKS0003 H-Position Adj Fixture</p> 
<p>Back Tension Meter (Tentelometer, Made in U.S.A.)</p> 	<p>VFKS0010 Post Adjustment Plate</p> 	<p>VFKS0004 Cassette Holder Fixture</p> 
<p>VFK0133 Dial Torque Gauge (Plastic Clamper Only)</p> 	<p>VFKS0009 Reel Table Height Fixture</p> 	<p>VFKS0029 V-Stopper Adj Fixture</p> 
<p>VFK0134 Adaptor for VFK0133</p> 	<p>VFKS0002 Tension Post Adj Plate</p> 	<p>VFK27 Head Cleaning Stick</p> 
<p>VFK0136 Fine Adjustment Screwdriver (3mmφ) (Long Shaft) VFKS0021 Fine Adjustment Screwdriver (3mmφ) (Short Shaft)</p> 	<p>VFK0144 Retaining Ring Remover (3mmφ) VFK0145 Retaining Ring Remover (4mmφ)</p> 	<p>MOR265 Molytone Grease</p> 
<p>VFKS0031 V-Hold Adj. Tool</p> 	<p>VFK0146 Hex. Wrench (0.9mm) VFK76 Hex. Wrench (1.5mm)</p> 	<p>VFKS0006 Guide Pin Fixture</p> 

ELECTRICAL ADJUSTMENT PROCEDURES

This section provides complete electrical adjustment procedures which may be required for electronic circuits of 3 speed selectable VHS video cassette recorder with 4 Head, CUE and REVIEW features, front loading mechanism.

1. TEST EQUIPMENT

To perform the electrical adjustment completely, the following equipment is required.

1. DVM (Digital Volt Meter)
Voltage Range: 0.001 — 50V
2. Dual-trace Oscilloscope
Voltage Range: 0.005 — 50V/Div.
Frequency Range: DC — 10MHz
Probes: 10:1, 1:1
3. Frequency Counter
Frequency Range: 0 — 300MHz
4. Signal Generator
Sinewave: 0 — 10MHz
5. AC Millivolt Meter
Voltage Range: 0 — 3mVrms.
6. Tuning Amp.
7. VIF Sweep Generator/VIF Trap Adjuster
8. Spectrum Analyzer
9. DC Power Supply Unit
Voltage: 0 — 15V DC
10. Variable Attenuator
Attenuate: 0dB — -50dB
11. Monitor Scope
12. Color TV Receiver or Monitor
13. V-Hold ADJ. Tool
(VFKS0031)
14. Plastic Tip Driver and Non-Metal Driver
15. VHS Alignment Tape
(VFMS0001H6)



Fig. E1

Start Counter Reading	0 (0)	0020 ± 8 (008 ± 6)	0135 ± 12 (060 ± 6)	0240 ± 20 (109 ± 10)
Video	Blank	Monoscope	Color Bars	Multi-Burst
Audio	Blank	6kHz (MONO)	3kHz (STEREO)	1kHz (MONO)

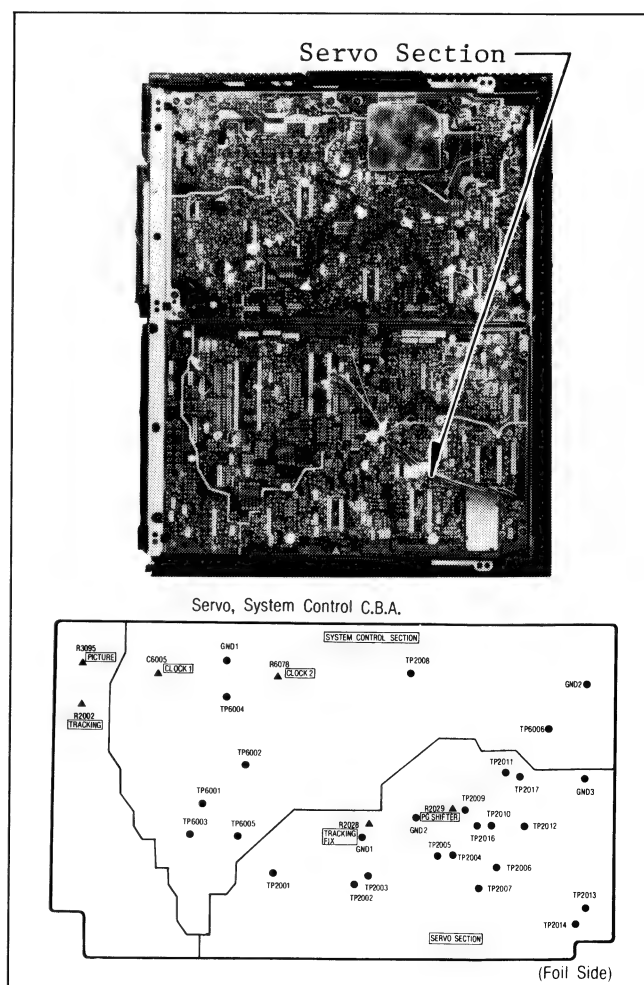
Fig. E2

2. ADJUSTMENT PROCEDURES

These adjustment procedures consist of the following sections.

1. Servo Section
2. Audio Section
3. Video Section
4. System Control Section
5. TV Demodulator Section
6. IR Remote Receiving Detector Section

2-1. Servo Section



2-1-1. Head Switching Position Adjustment

Test Points: TP2008, TP3007
Adjustment : R2029 (PG SHIFTER)

1. Playback color bar section of the alignment tape.
2. Connect the scope CH1 to TP3007 on the Luminance section and CH2 to TP2008 on the Servo section. Set the scope to the CHOP mode.
3. Also set the scope to the Delay mode or expand the vertical interval of the signal from TP3007.
4. Adjust the PG SHIFTER (R2029) so that the head switching point is $6 \pm 1H$ before the start of vertical sync as shown below.

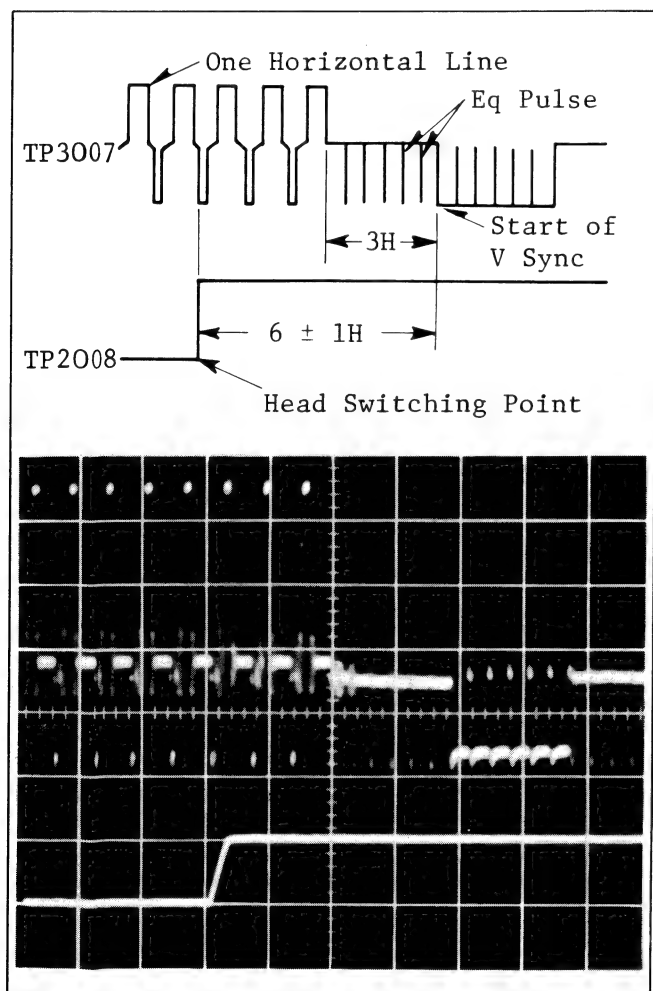


Fig. E4 TP3007 0.5V/0.1msec. div.
TP2008 5V/0.1msec. div.

5. Change the slope selector on the scope from "+" to "-" and make sure that the other switching point is also $6H \pm 1H$ before the beginning of vertical sync.

2-1-2. Tracking FIX Adjustment

Test Points: TP2008, TP2010
Adjustment: R2028 (T. FIX)

1. Supply a video signal to the Video Input on the rear panel or tune in a local TV program.
2. Turn the Tracking Control on the front panel to the center detent point.
3. Insert a cassette and make a recording in the SP mode for a few minutes.
4. Playback the portion just recorded.
5. Connect the scope CH1 to TP2008 and CH2 to TP2010 on the Servo section.
6. Adjust the T. FIX (R2028) so that the T is $0.0 \pm 0.4\text{msec.}$

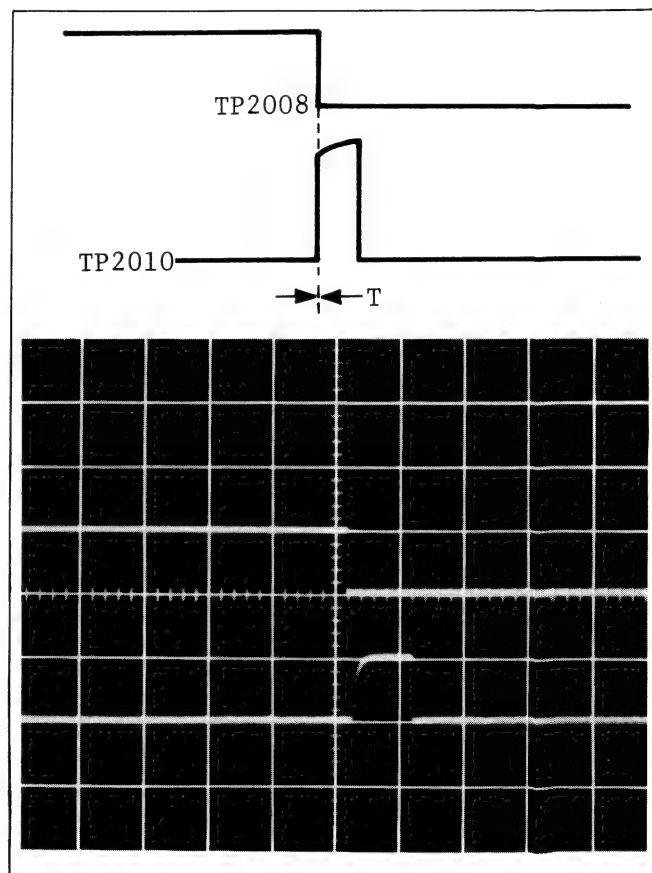


Fig. E5 TP2008 5V/0.2msec. div.
TP2010 5V/0.2msec. div.

2-2. Audio Section

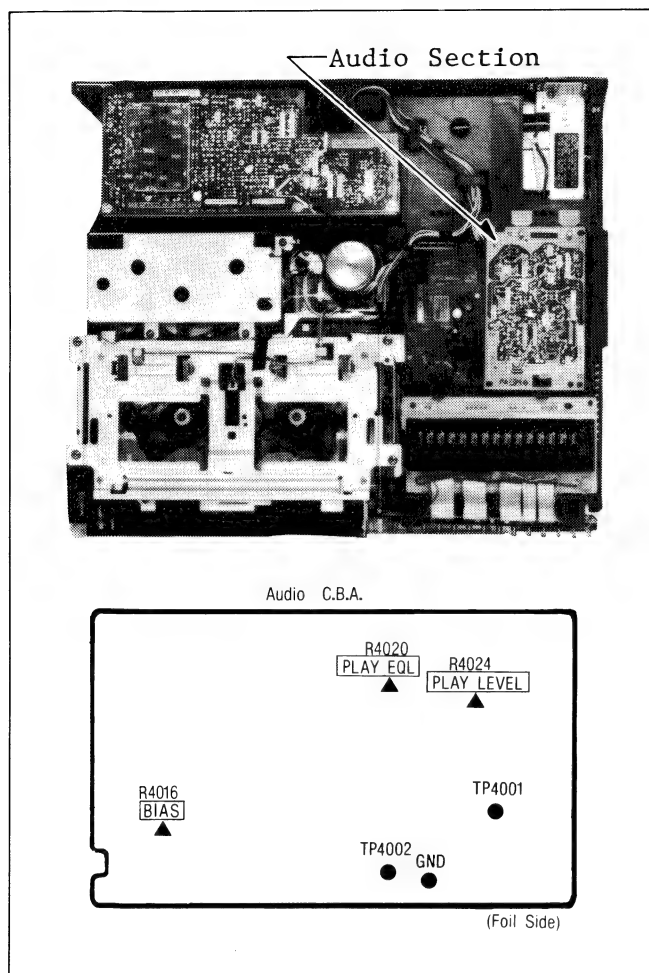


Fig. E6

2-2-1. Bias Current Adjustment

Test Point: Audio Head Terminal
Adjustment: R4016 (BIAS ADJ)

1. Plug in a phono plug to the Audio Input on the rear panel, but do not supply the Audio signal.
2. Insert a cassette and make a recording in the SP mode.
3. Connect the AC Millivolt Meter as shown below.

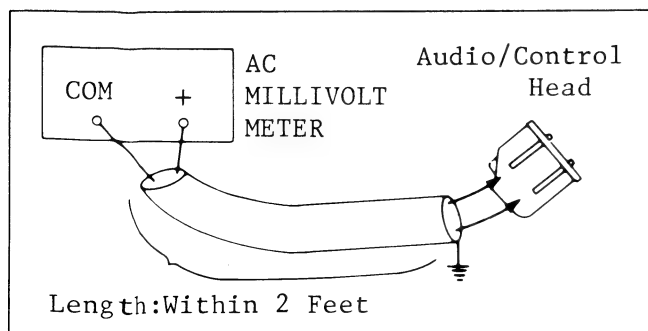


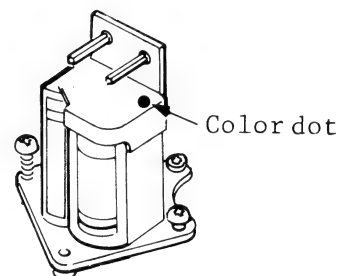
Fig. E7

4. While the recording is taking place, adjust the BIAS ADJ (R4016) on the Audio section so that the voltage is $2.4 \pm 0.05\text{mVrms}$.

(Specification should be decided by the color of the dot on A/C Head.)

COLOR DOT	ADJUSTMENT VOLTAGE
NO COLOR DOT	$2.4 \pm 0.05\text{mVrms}$
RED COLOR	$2.1 \pm 0.05\text{mVrms}$
GREEN COLOR	$2.7 \pm 0.05\text{mVrms}$

Audio/Control Head



Adjustment should be made depending on the color of the dot on the A/C head as above.

Fig. E8

5. Remove the AC Millivolt Meter.

Note:

For service replacement, A/C Head without color dot is supplied.

2-2-2. Playback Gain and Equalization Adjustment

Test Point: TP4001

Adjustments: R4024 (PB GAIN)
R4020 (PB EQL)

1. Supply a sinewave signal (1kHz and 5kHz, -30dB, 89mVp-p) to the Audio Input on the rear panel.
2. Supply the video signal to the Video Input on the rear panel.
3. Connect the AC Millivolt Meter to TP4001 on the Audio section.
4. Insert a cassette and make a recording 1kHz first then 5kHz signal in the SP mode.
Read the voltage of 1kHz.
5. Playback the portion just recorded.
6. Adjust PB GAIN (R4024) so that the voltage of playback is equal to that of recording.
7. Adjust the PB EQL (R4020) so that the 1kHz and 5kHz outputs are balanced.
8. Remove the AC Millivolt Meter.

2-3. Video Section

(Luminance & Chrominance)

Luminance Section

Chrominance Section

Luminance, Chrominance, Power Supply & Tuner Control C.B.A.

LUMINANCE SECTION

CHROMINANCE SECTION

POWER SUPPLY SECTION

TV DEMODULATOR SECTION

(Foil Side)

Luminance, Chrominance, Power Supply & Tuner Control C.B.A.

LUMINANCE SECTION

CHROMINANCE SECTION

POWER SUPPLY SECTION

TV DEMODULATOR SECTION

(Component Side)

—Chrominance Section

The diagram is a floor plan of the RCA Victor Company, Inc. Research and Development Laboratories. It is divided into several functional sections, each enclosed in a box:

- TV DEMODULATOR SECTION**: Located in the top left, containing room R7002 (RF REC).
- POWER SUPPLY SECTION**: Located in the top right, containing room R801.
- LUMINANCE SECTION**: Located in the center, containing rooms R8030 (V. LOCK), R7001, R7002, TP3007, R804, TP3002, TP3005, R8027 (EE LEVEL), TP3004, TP3008, R8030 (WHITE CLIP), R8037 (3000H VCO), R8038 (3000H VCO), R8039 (3000H VCO), R8040 (3000H VCO), R8041 (3000H VCO), R8042 (3000H VCO), R8043 (3000H VCO), R8044 (3000H VCO), R8045 (3000H VCO), R8046 (3000H VCO), R8047 (3000H VCO), R8048 (3000H VCO), R8049 (3000H VCO), R8050 (3000H VCO), R8051 (3000H VCO), R8052 (3000H VCO), R8053 (3000H VCO), R8054 (3000H VCO), R8055 (3000H VCO), R8056 (3000H VCO), R8057 (3000H VCO), R8058 (3000H VCO), R8059 (3000H VCO), R8060 (3000H VCO), R8061 (3000H VCO), R8062 (3000H VCO), R8063 (3000H VCO), R8064 (3000H VCO), R8065 (3000H VCO), R8066 (3000H VCO), R8067 (3000H VCO), R8068 (3000H VCO), R8069 (3000H VCO), R8070 (3000H VCO), R8071 (3000H VCO), R8072 (3000H VCO), R8073 (3000H VCO), R8074 (3000H VCO), R8075 (3000H VCO), R8076 (3000H VCO), R8077 (3000H VCO), R8078 (3000H VCO), R8079 (3000H VCO), R8080 (3000H VCO), R8081 (3000H VCO), R8082 (3000H VCO), R8083 (3000H VCO), R8084 (3000H VCO), R8085 (3000H VCO), R8086 (3000H VCO), R8087 (3000H VCO), R8088 (3000H VCO), R8089 (3000H VCO), R8090 (3000H VCO), R8091 (3000H VCO), R8092 (3000H VCO), R8093 (3000H VCO), R8094 (3000H VCO), R8095 (3000H VCO), R8096 (3000H VCO), R8097 (3000H VCO), R8098 (3000H VCO), R8099 (3000H VCO), R8100 (3000H VCO).
- CHROMINANCE SECTION**: Located in the bottom left, containing rooms R8018 (3200H VCO), R8032 (P/B CHROMA LEVEL), R8037 (HORIZ. GANCELLER), R8041 (3000H VCO), R8042 (3000H VCO), R8043 (3000H VCO), R8044 (3000H VCO), R8045 (3000H VCO), R8046 (3000H VCO), R8047 (3000H VCO), R8048 (3000H VCO), R8049 (3000H VCO), R8050 (3000H VCO), R8051 (3000H VCO), R8052 (3000H VCO), R8053 (3000H VCO), R8054 (3000H VCO), R8055 (3000H VCO), R8056 (3000H VCO), R8057 (3000H VCO), R8058 (3000H VCO), R8059 (3000H VCO), R8060 (3000H VCO), R8061 (3000H VCO), R8062 (3000H VCO), R8063 (3000H VCO), R8064 (3000H VCO), R8065 (3000H VCO), R8066 (3000H VCO), R8067 (3000H VCO), R8068 (3000H VCO), R8069 (3000H VCO), R8070 (3000H VCO), R8071 (3000H VCO), R8072 (3000H VCO), R8073 (3000H VCO), R8074 (3000H VCO), R8075 (3000H VCO), R8076 (3000H VCO), R8077 (3000H VCO), R8078 (3000H VCO), R8079 (3000H VCO), R8080 (3000H VCO), R8081 (3000H VCO), R8082 (3000H VCO), R8083 (3000H VCO), R8084 (3000H VCO), R8085 (3000H VCO), R8086 (3000H VCO), R8087 (3000H VCO), R8088 (3000H VCO), R8089 (3000H VCO), R8090 (3000H VCO), R8091 (3000H VCO), R8092 (3000H VCO), R8093 (3000H VCO), R8094 (3000H VCO), R8095 (3000H VCO), R8096 (3000H VCO), R8097 (3000H VCO), R8098 (3000H VCO), R8099 (3000H VCO), R8100 (3000H VCO).
- PLAY-VIDEOT LEVEL**: Located in the bottom right, containing room R8041 (3000H VCO).

Other rooms and equipment labeled include:

- R7002 (RF REC)
- R8018 (3200H VCO)
- R8032 (P/B CHROMA LEVEL)
- R8037 (HORIZ. GANCELLER)
- R8041 (3000H VCO)
- R8042 (3000H VCO)
- R8043 (3000H VCO)
- R8044 (3000H VCO)
- R8045 (3000H VCO)
- R8046 (3000H VCO)
- R8047 (3000H VCO)
- R8048 (3000H VCO)
- R8049 (3000H VCO)
- R8050 (3000H VCO)
- R8051 (3000H VCO)
- R8052 (3000H VCO)
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- R8057 (3000H VCO)
- R8058 (3000H VCO)
- R8059 (3000H VCO)
- R8060 (3000H VCO)
- R8061 (3000H VCO)
- R8062 (3000H VCO)
- R8063 (3000H VCO)
- R8064 (3000H VCO)
- R8065 (3000H VCO)
- R8066 (3000H VCO)
- R8067 (3000H VCO)
- R8068 (3000H VCO)
- R8069 (3000H VCO)
- R8070 (3000H VCO)
- R8071 (3000H VCO)
- R8072 (3000H VCO)
- R8073 (3000H VCO)
- R8074 (3000H VCO)
- R8075 (3000H VCO)
- R8076 (3000H VCO)
- R8077 (3000H VCO)
- R8078 (3000H VCO)
- R8079 (3000H VCO)
- R8080 (3000H VCO)
- R8081 (3000H VCO)
- R8082 (3000H VCO)
- R8083 (3000H VCO)
- R8084 (3000H VCO)
- R8085 (3000H VCO)
- R8086 (3000H VCO)
- R8087 (3000H VCO)
- R8088 (3000H VCO)
- R8089 (3000H VCO)
- R8090 (3000H VCO)
- R8091 (3000H VCO)
- R8092 (3000H VCO)
- R8093 (3000H VCO)
- R8094 (3000H VCO)
- R8095 (3000H VCO)
- R8096 (3000H VCO)
- R8097 (30

(Foil Side)

(Component Side)

Fig. E9

(Head AMP)

Head AMP section

Head Amp C.B.A.

(Foil Side)

Head Amp C.B.A.

(Component Side)

(File Side)

Figure 1 is a schematic diagram of a chromosome spread. It features a large, irregular black outline representing the spread. Inside, various bands are labeled with text and symbols. The labels include: C301, LP/SLP R CH PEAK, R3594, TP3503, TP3502, TP3517, R3501, REC LUMINANCE, TP3519, TP3518, TP3512, R3504, REC CHROMA, GNI, SP R CH PEAK, C3585, C35%, TP3510, TP3513, TP3514, SP L CH PEAK, C3575, TP3511, TP3504, TP3501, GND 2, and TP3505. The labels are arranged in a way that suggests a spatial distribution of these bands across the chromosome spread.

(Component Side)

Fig. E10

2-3-1. Head Amp Peak Frequency Adjustment

Test Point: TP3504

Adjustments: C3575 (PEAK-L ADJ-SP)
C3576 (PEAK-R ADJ-SP)
C3587 (PEAK-R ADJ-LP/SLP)
C3588 (PEAK-L ADJ-LP/SLP)

A: Factory Adjustment

1. Do not supply any video and RF signal on the rear panel.
2. Turn controls as follows.
(From Foil Side)
R3585 Fully Clockwise
R3584 Fully Counter-clockwise
R3594 Fully Clockwise
R3595 Fully Counter-clockwise
- (1) SP mode
1. Connect the sweep generator to TP3518 on the Head AMP section. Put the marker on 4.5MHz.
2. Connect a jumper between TP6002 on the System Control section and TP2006 on the Serve section.
3. Connect a jumper between TP 6006 and GND on the System Control section.
4. Push the Cassette in SW on the cassette up unit. (Cassette in SW turns ON.)
5. Push the Cassette Holder.

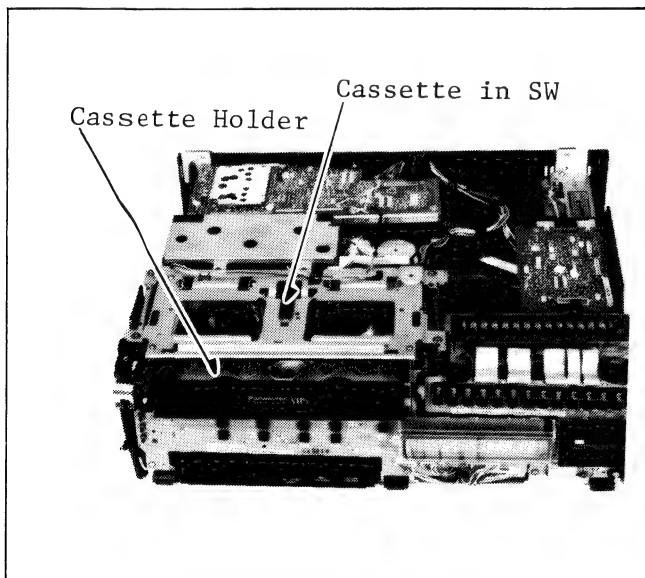


Fig. E11

6. Confirm that the unit is the Cassette Loading completion condition.
7. Place the unit in the PLAY mode without a tape.
8. Connect the scope to TP3504 on the Head AMP section.
9. Adjust the level of sweep generator to $200 \pm 50\text{mVp-p}$ at 4.5MHz on TP3504.
10. Adjust the (PEAK-R ADJ-SP) (C3576) and the (PEAK-L ADJ-SP) (C3575) so that the peak on the scope is $4.5 \pm 0.1\text{MHz}$.

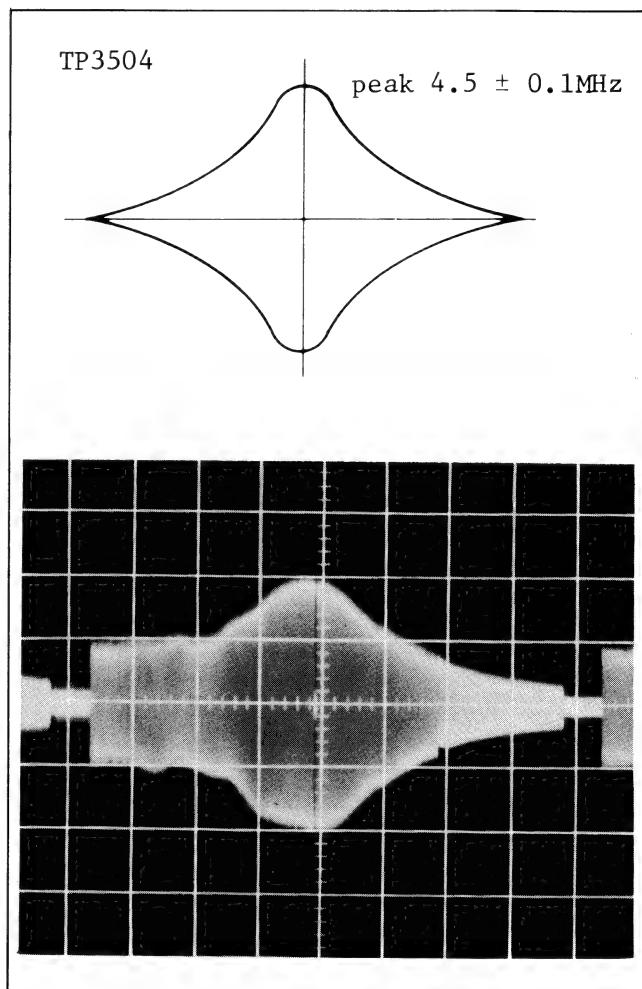


Fig. E12 TP3504 20mV/20μsec. div.

11. Remove the jumpers.

(2) LP/SLP mode

1. Change the sweep generator to TP3519 on the Head AMP section. Put the marker on 4.5MHz.
2. Connect a jumper between TP6002 on the System Control section and TP2006 on the Servo section.
3. Connect a jumper between TP6006 and GND on the System Control section.
4. Push the Cassette in SW on the cassette up unit. (Cassette in SW turns ON.)
5. Push the Cassette Holder.
6. Confirm that the unit is the Cassette Loading completion condition.
7. Place the unit in the PLAY mode without a tape.
8. Connect the scope to TP3504 on the Head AMP section.
9. Adjust the level of sweep generator to $200 \pm 50\text{mVp-p}$ at 4.5MHz at TP3504.
10. Adjust the PEAK-L ADJ-LP/SLP (C3588) and the PEAK-R ADJ-LP/SLP (C3588) so that the peak of the waveforms is $4.5 \pm 0.1\text{MHz}$.
11. Remove the jumpers.

B: Field Adjustment

1. Do not supply any video or RF signal.
2. Turn controls as follows.
R3585 Fully Clockwise
R3584 Fully Counter-clockwise
R3594 Fully Clockwise
R3595 Fully Counter-clockwise

(1) SP mode

1. Connect the sinewave generator to TP3518 on the Head AMP section.
2. Connect a jumper between TP6002 on the System Control section and TP2006 on the Servo section.
3. Connect a jumper between TP6006 and GND on the System Control section.
4. Push the Cassette in SW on the cassette up unit. (Cassette in SW turns ON.)
5. Push the Cassette Holder.
6. Confirm that the unit is the Cassette Loading completion condition.

7. Place the unit in the PLAY mode without a tape.
8. Connect the scope to TP3504 on the Head AMP section.
9. Adjust the frequency of the sinewave generator to $4.5 \pm 0.1\text{MHz}$ at TP3504.
10. Adjust the level of the sinewave generator to $200 \pm 50\text{mVp-p}$ at TP3504.
11. Adjust the PEAK-R ADJ-SP (C3576) and the PEAK-L ADJ-SP (C3575) so that the envelope on the scope becomes maximum.

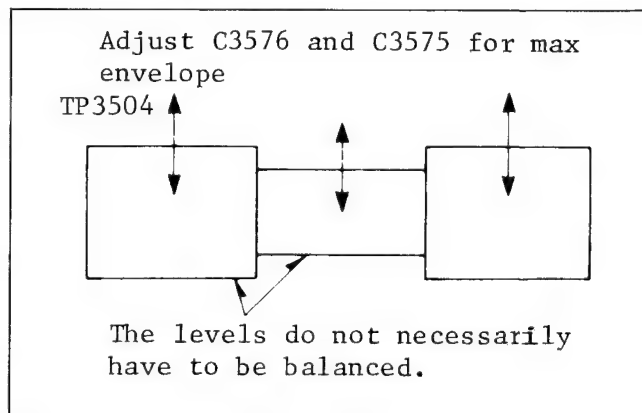


Fig. E13

12. Remove the jumpers.

(2) LP/SLP mode

1. Change the sinewave generator to TP3519 on the Head AMP section.
2. Connect a jumper between TP6002 on the System Control section and TP2006 on the Servo section.
3. Connect a jumper between TP6006 and GND on the System Control Section.
4. Push the Cassette in SW on the cassette up unit. (Cassette in SW turns ON.)
5. Push the Cassette Holder.
6. Confirm that the unit is the Cassette Loading completion condition.
7. Place the unit in PLAY mode without a tape.
8. Connect the scope to TP3504 on the Head AMP section.
9. Adjust the frequency of the sinewave generator to $4.5 \pm 0.1\text{MHz}$ at TP3504.
10. Adjust the level of the sinewave generator to $200 \pm 50\text{mVp-p}$ at TP3504.
11. Adjust the PEAK-L ADJ-LP/SLP (C3588) and the PEAK-R ADJ-LP/SLP (C3588) so that the envelope on the scope becomes maximum.
12. Remove the jumpers.

2-3-2. Head Amp Frequency Response and Balance Adjustment

Test Points: TP3503, TP3504, TP3512
TP3513, TP3515, TP3516

Adjustments: R3585 (HEAD Q SP R)
R3584 (HEAD Q SP L)
R3594 (HEAD Q LP/SLP R)
R3595 (HEAD Q LP/SLP L)

A: Factory Adjustment

1. Supply the V sync to Video Input on the rear panel.
2. Connect jumper between TP3502 and GND to prevent the video signal except composite syncs from being applied to the following circuits.
3. Connect the sweep generator to TP3503. Put the marker on 2MHz, 3.4MHz and 4.5MHz.

(1) SP mode

1. Connect the scope between TP3513 (HOT) and TP3512 (GND) on the Head AMP section.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Adjust the level of sweep generator to 140mVp-p at 3.4MHz.

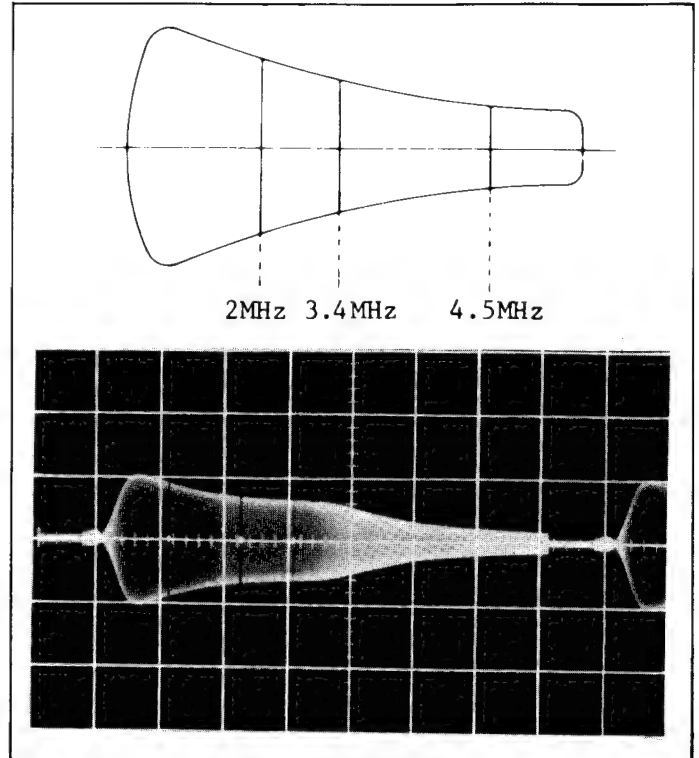


Fig. E14 TP3513 0.1V/2msec. div.

4. Playback the portion just recorded.
5. Connect the scope to TP3504. Trigger the scope with TP2008.
6. Remove the Sweep Generator.
7. Connect a jumper between TP3514 and GND.
8. Adjust the HEAD Q SP-L (R3584) so that the level at 4.5MHz is $80\% \pm 10\%$ of level at 2MHz as shown in Fig. E15.

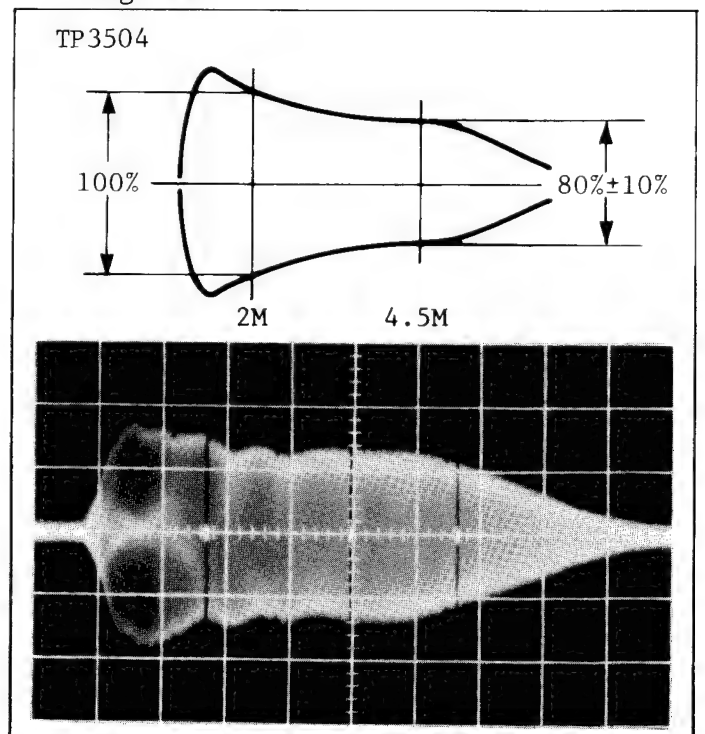


Fig. E15 TP3504 20mV/2msec.div.

9. Remove the jumper between TP3514 and GND.
10. Connect the jumper between TP3513 and GND.
11. Adjust the HEAD Q SP-R (R3585) so that the levels at 2MHz and 4.5MHz are shown in Fig. E15.
12. Remove the jumpers.

(2) LP/SLP mode

1. Connect the scope between TP3516 (HOT) and TP3515 (GND).
2. Insert a cassette and make a recording in the LP mode for a few minutes.
3. Adjust the Sweep Generator so that the level at 3.4MHz is 110mVp-p at TP3516.
4. Playback the portion just recorded.
5. Connect the scope to TP3504. Trigger the scope with TP2008.
6. Remove the Sweep Generator.
7. Connect the jumper between TP3516 and GND.
8. Adjust the HEAD Q LP/SLP-L (R3595) so that the levels between 2MHz and 4.5MHz are shown in Fig. E15.
9. Remove a jumper between TP3516 and GND.
10. Connect the jumper between TP3517 and GND.
11. Adjust the HEAD Q LP/SLP-R (R3594) so that the level between 2MHz and 4.5MHz are shown in Fig. E15.
12. Remove the jumpers.

B: Field Adjustment

1. Supply a B/W signal to the Video Input or tune in a local TV program.
2. Connect jumper between TP3502 and GND to prevent the video signal except composite syncs from being applied to the following circuits.
3. Connect the sinewave generator to TP3503 on the Head AMP section.

(1) SP mode

1. Set the frequency of the sinewave generator to 3.4MHz.
2. Connect the scope between TP3513 (HOT) and TP3512 (GND) on the Head AMP section.
3. Insert a cassette and make a recording in the SP mode for a few minutes.
4. Adjust the output level of the sinewave generator so that the level of TP3513 is 140 mVp-p.
5. Change the frequency of the sinewave generator from 3.4MHz to 2.0MHz and make a recording for about 10sec.

6. Then, change the frequency from 2.0 MHz to 4.5MHz and make a recording for about 10 sec.

7. Repeat above steps 5 and 6 for a couple of times.

8. Playback the portion just recorded.

9. Connect the scope to TP3504 on the Head AMP section.

Trigger the scope with TP2008.

10. Remove the Sinewave Generator.

11. Connect a jumper between TP3514 and GND.

12. Adjust the HEAD Q SP-L (R3584) so that the level at 4.5MHz is $80\% \pm 10\%$ of level at 2MHz.

13. Remove a jumper between TP3514 and GND.

14. Connect the jumper between TP3513 and GND.

15. Adjust the HEAD Q SP-R (R3585) same as item 12.

16. Remove the jumpers.

(2) LP/SLP mode

1. Set the frequency of sinewave generator to 3.4MHz.

2. Connect the scope between TP3516 (HOT) and TP3515 (GND).

3. Insert a cassette and make a recording in the LP mode for a few minutes.

4. Adjust the output level of the sinewave generator so that the level at TP3516 is 110mVp-p.

5. Change the frequency of the sinewave generator from 3.4MHz to 2.0MHz and make a recording for about 10sec.

6. Then, change the frequency from 2.0MHz to 4.5MHz and make a recording for about 10sec.

7. Repeat above steps 5 and 6 for a couple of times.

8. Playback the portion just recorded.

9. Connect the scope to TP3504 on the Head AMP section.

Trigger the scope with TP2008.

10. Remove the sinewave Generator.

11. Connect a jumper between TP3516 and GND.

12. Adjust the HEAD Q LP/SLP-L (R3595) so that the level at 4.5MHz is $80\% \pm 10\%$ of level at 2MHz.

13. Remove a jumper between TP3516 and GND.

14. Connect a jumper between TP3517 and GND.

15. Adjust the HEAD Q LP/SLP-R (R3594) same as item 12.

16. Remove the jumpers.

2-3-3. E-E Level Adjustment

Test Point: TP3007

Adjustment: R3027 (E-E LEVEL)

1. Supply the video signal (1Vp-p) to the Video Input on the rear panel.
2. Connect the scope to TP3007 on the Luminance section.
3. Place the unit in STOP mode.
4. Adjust the E-E LEVEL (R3027) on the Luminance section so that the video level is 2.0 ± 0.1 Vp-p.

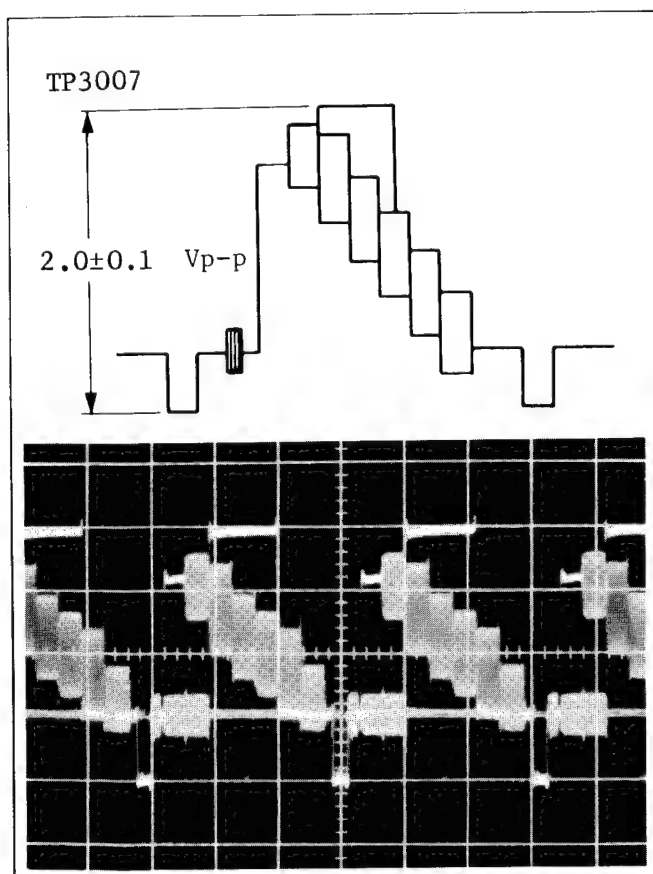


Fig. E16 TP3007 0.5V/20μsec. div.

2-3-4. Sync Tip Frequency and Deviation Adjustment

Test Point: TP3502

Adjustments: R3018 (SYNC TIP FREQ)
R3016 (DEVIATION)

1. Plug in a phono plug to the Video Input on the rear panel, but do not supply video signal.
2. Connect the frequency counter to TP3502 on the Head AMP section.

3. Insert a cassette and place the unit in SP REC mode.
4. Adjust the SYNC TIP FREQ (R3018) so that the frequency is 3.4 ± 0.04 MHz.
5. Remove the frequency counter.
6. Connect a 0.01μF capacitor between TP3502 and TP3518 on the Head AMP section.
7. Connect a signal generator (sinewave) to TP3518 through a 1kΩ resistor and a 0.01μF capacitor.

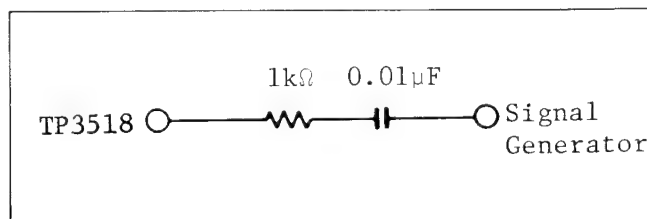


Fig. E17

8. Set the WHITE CLIP (R3030) and the DARK CLIP (R3017) to center position.
9. Supply a NTSC Color bar (100% White) signal to the Video Input on the rear panel.
10. Connect the 1000pF capacitor between junction of L3002 and R3037, and GND.

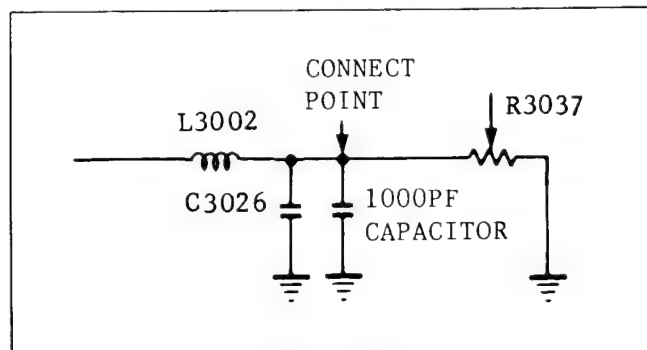


Fig. E18

11. Connect the scope to the junction of L3002 and R3037 on the Luminance section.
12. Set the frequency of the signal generator to 4.35 MHz \pm 40 kHz.
13. Adjust the DEVIATION (R3016) for minimum carrier at peak white.
14. Remove the jumpers, resistors and capacitors.
15. Connect the scope to TP3007 on the Luminance section.
16. Insert a cassette and make a recording in the SP mode for a few minutes.
17. Playback the portion just recorded.

18. Confirm that the level of the video signal is $2.0 \pm 0.1V_{p-p}$.
19. Make White and Dark Clip adjustment.

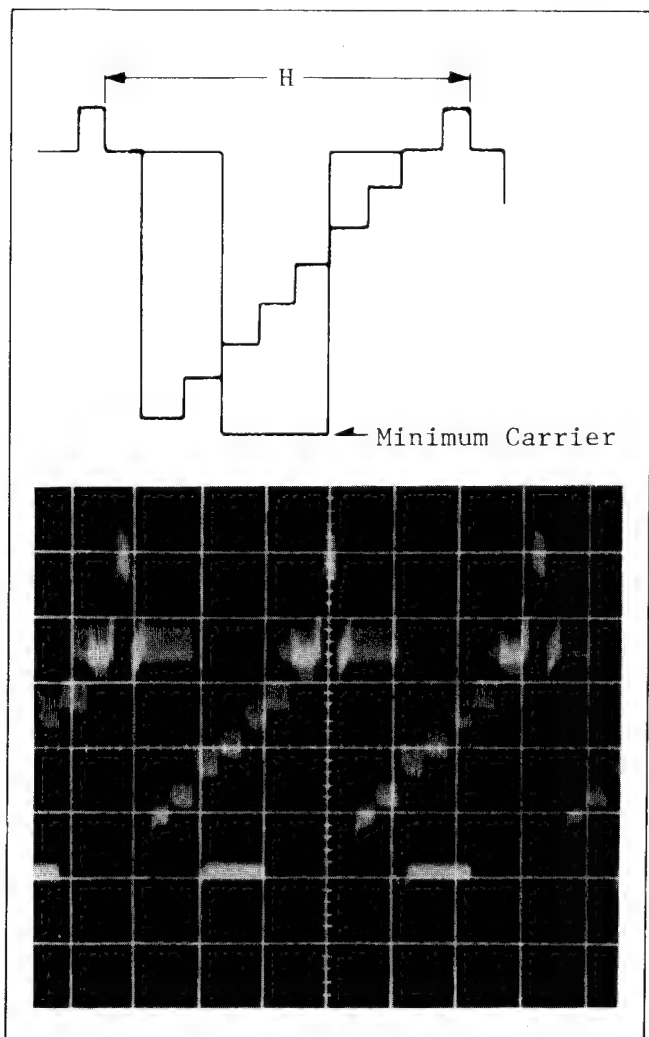


Fig. E19 20mV/20μsec. div.

2-3-5. White and Dark Clip Adjustment

Test Point: TP3003

Adjustments: R3017 (DARK CLIP)
R3030 (WHITE CLIP)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Connect the scope to TP3003 on the Luminance section.
3. Place the unit in LP RECORD mode.
4. Adjust the WHITE CLIP ADJ (R3030) and the DARK CLIP ADJ (R3017) on the Luminance section so that the overshoot and undershoot are as shown below.

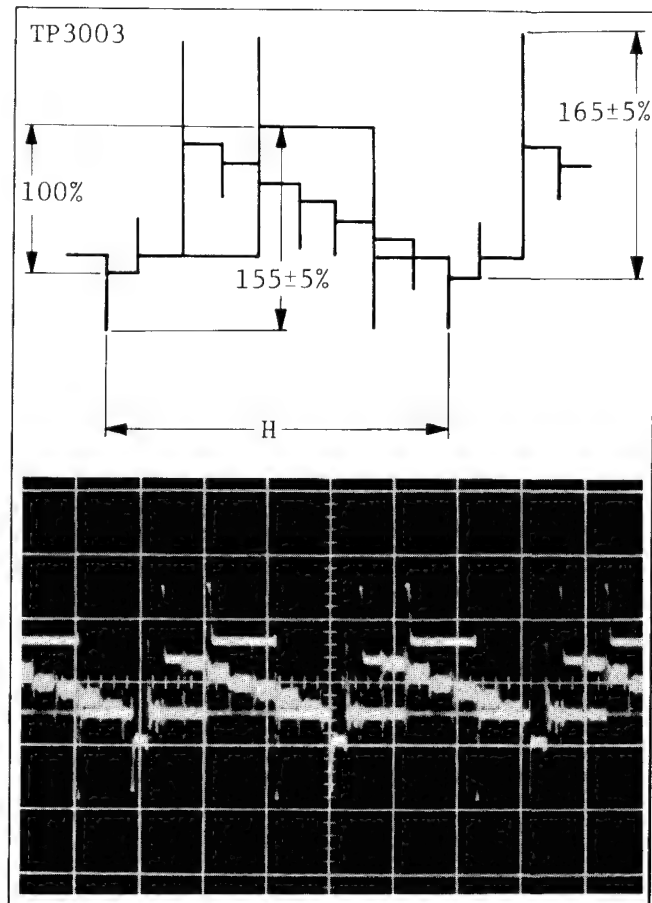


Fig. E20 TP3003 0.2V/20μsec. div.

2-3-6. Recording Current Adjustment

Test Points: TP3515, TP3516

Adjustments: R3501 (REC CURR)

R3504 (REC CHROMA)

1. Supply a color bar signal to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the LP mode.
3. Connect the scope between TP3516 (HOT) and TP3515 (GND) on the HEAD AMP section. Use TP2008 as a trigger.
4. Turn the REC CURR (R3501) fully clockwise from the foil side.
5. Set the scope 20mV/div., 10μsec/div. Use TP3004 as scope trigger.
6. Adjust the REC CHROMA (R3504) on the HEAD AMP section so that the level of cyan portion is $32 \pm 3mV_{p-p}$.

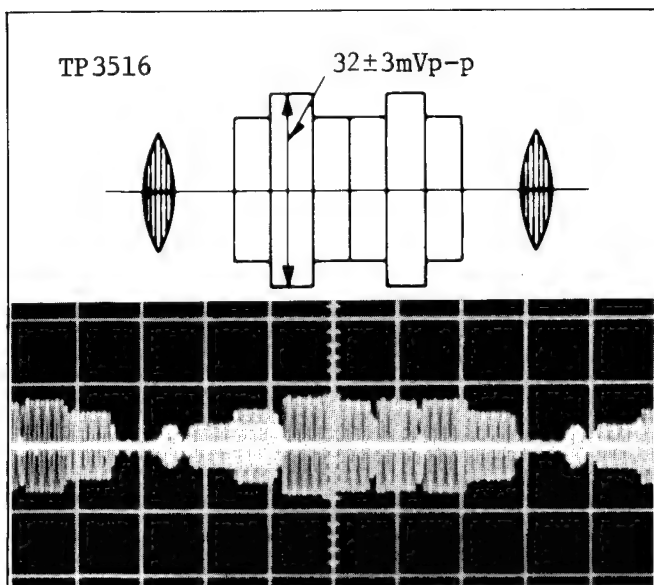


Fig. E21 TP3516 20mV/10μsec/div.

7. Then set the scope 20mV-div., 2msec/div.
Use TP2008 as scope trigger.
8. Adjust the REC CURR (R3501) on the HEAD AMP section so that the level of sync portion is $120 \pm 3\text{mVp-p}$.

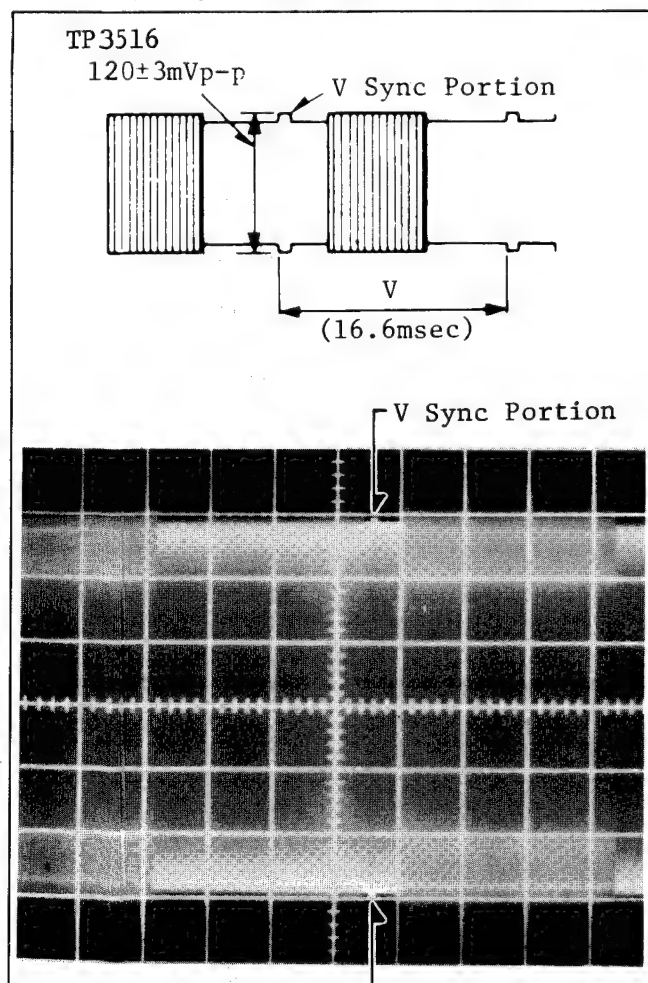


Fig. E22 TP3516 20mV/2msec.div.

2-3-7. 320FH VCO Adjustment

Test Point: TP8001

Adjustment: R8018 (320FH VCO)

1. Place the unit in STOP mode.
2. Connect a jumper between TP8004 and TP8005.
3. Connect the frequency counter to TP8001 on the Chrominance section.
4. Adjust the 320FH VCO (R8018) on the Chrominance section so that the frequency is $4.2 \pm 0.3\text{MHz}$.
5. Remove the jumper.

2-3-8. 3.58MHz VXO Adjustment

Test Point: TP8002

Adjustment: C8038 (3.58MHz VXO)

1. Place the unit in STOP mode.
2. Connect the frequency counter TP8002 on the Chrominance section.
3. Adjust the 3.58MHz VXO (C8038) from the component side so that the frequency at TP8002 is $3.579545\text{MHz} \pm 10\text{Hz}$.

2-3-9. Playback level Adjustment

Test Point: TP3007

Adjustment: R3043 (P.B. VIDEO LEVEL)

R8032 (P.B. CHROMA)

1. Supply a color bar signal (1Vp-p) to the Video Input on the rear panel.
2. Insert a cassette and make a recording in the SP mode for a few minutes.
3. Connect the scope to TP3007 on the Luminance section.
4. Playback the portion just recorded.
5. During playback, adjust the P.B. VIDEO LEVEL (R3043) so that the video level is $2.0 \pm 0.1\text{Vp-p}$.
6. Then, adjust the P.B. CHROMA (R8032) so that the cyan level is $1.2 \pm 0.2\text{Vp-p}$.

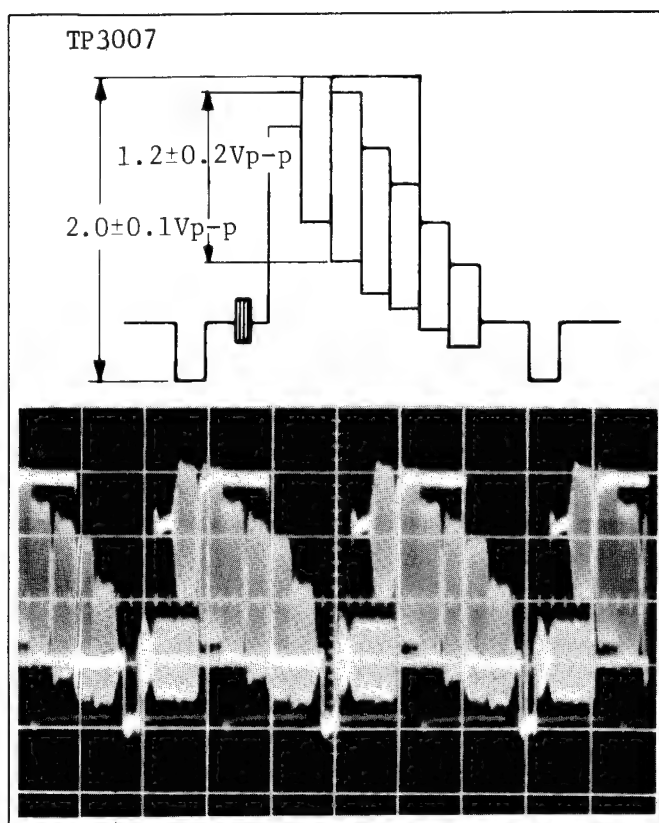


Fig. E23 TP3007 0.5V/20μsec. div.

2-3-10. Low Frequency Noise Canceller Adjustment

Test point: TP3006

Adjustment: R3037 (LINE NOISE CANCELLER)

1. Supply a color bar signal (1Vp-p) to the Video Input on the rear panel.
2. Place the unit in the SLP mode and make a recording for a few minutes.
3. Playback the portion just recorded.
4. Connect the scope to TP3006 on the Luminance Section.
5. During playback, adjust the LINE NOISE CANCELLER (R3037) so that the width (w) of signal on TP3006 is minimum.

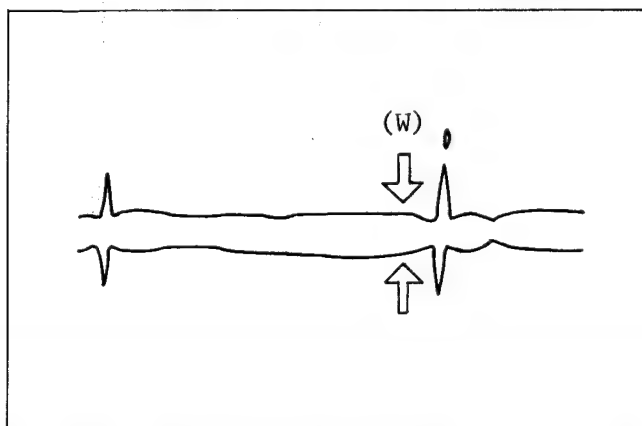


Fig. E24

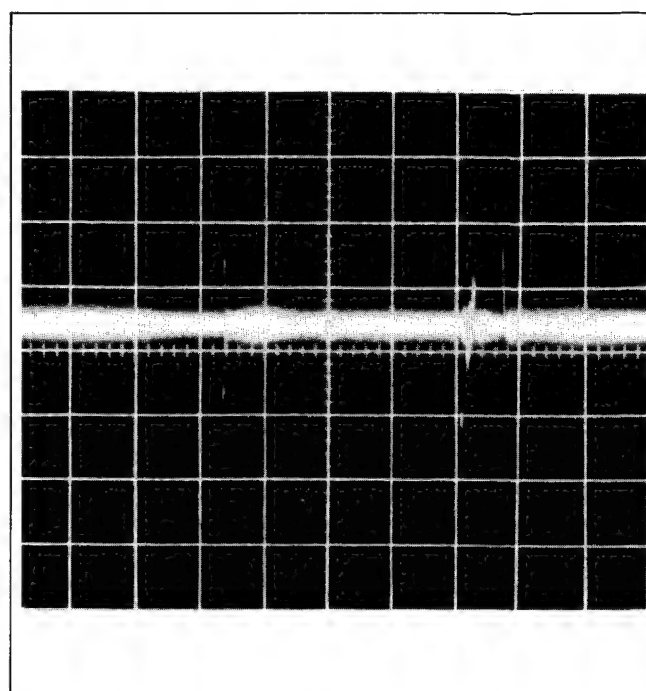


Fig. E25 TP3006 50mV/2msec. div.

2-3-11. V Lock Adjustment

Equipment: TV Monitor

Adjustment: R3080 (V-Lock)

1. Supply a color bar signal to the Video Input on the rear panel or tune in a local TV program.
2. Insert a cassette and make a recording in the SLP mode for a few minutes.
3. Playback the portion just recorded.
4. Turn the slow tracking VR on the front panel to the center detect point.
5. Place the unit in PAUSE/STILL mode.
6. Adjust the V-Lock (R3080) so that the center of picture is most stable.

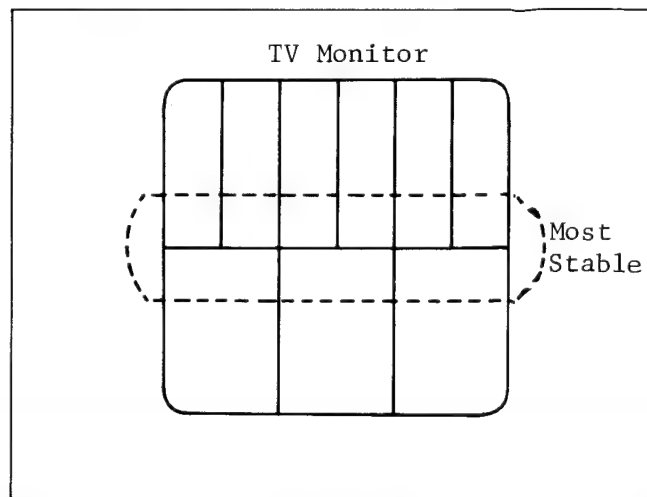
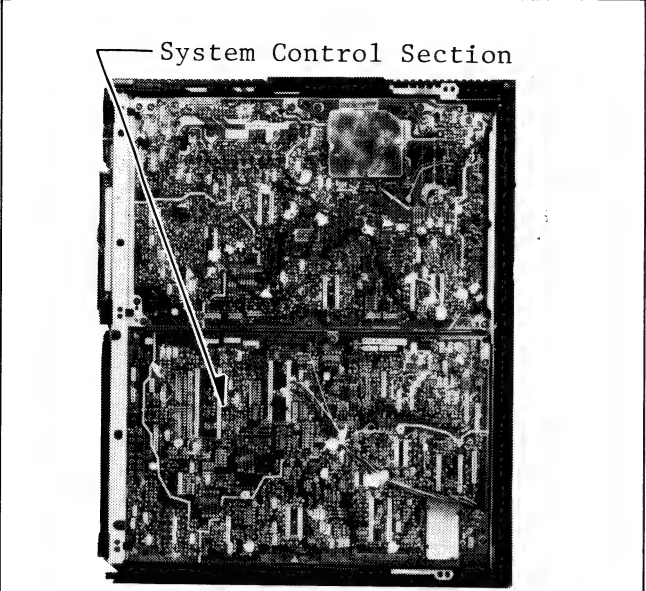
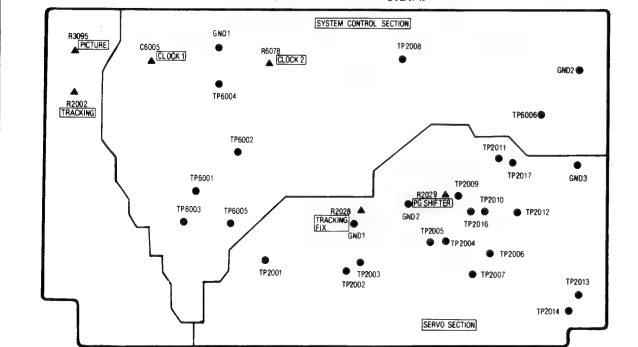


Fig. E26

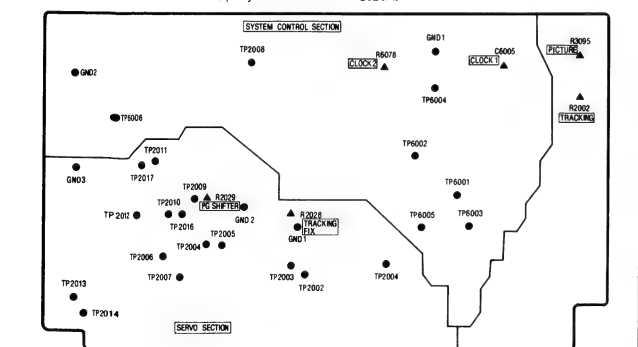
2-4. System Control Section



Servo, System Control C.B.A.



(Foil Side)



(Component Side)

Fig. E27

2-4-1. CLOCK 1 Adjustment

Test Point: TP6002

Adjustment: C6005 (CLOCK 1)

1. Connect the frequency counter with 10:1 Probe to TP6002 on the system control section.
2. Remove the wire W117 from the component side on the System Control board.
3. Adjust the CLOCK 1 (C6005) from the component side so that the frequency at TP6002 is $349.525 \pm 0.01 \text{ KHz}$.
4. Remove the frequency counter.
5. Return the wire W117.

2-4-2. CLOCK 2 Adjustment

Test Point: TP6005

Adjustment: R6078 (CLOCK 2)

1. Connect the scope to TP6005 on the system control section.
2. Place the unit in STOP mode.
3. Adjust the CLOCK 2 (R6078) on the system control section so that the "T" is $100 \pm 2 \mu\text{sec}$.

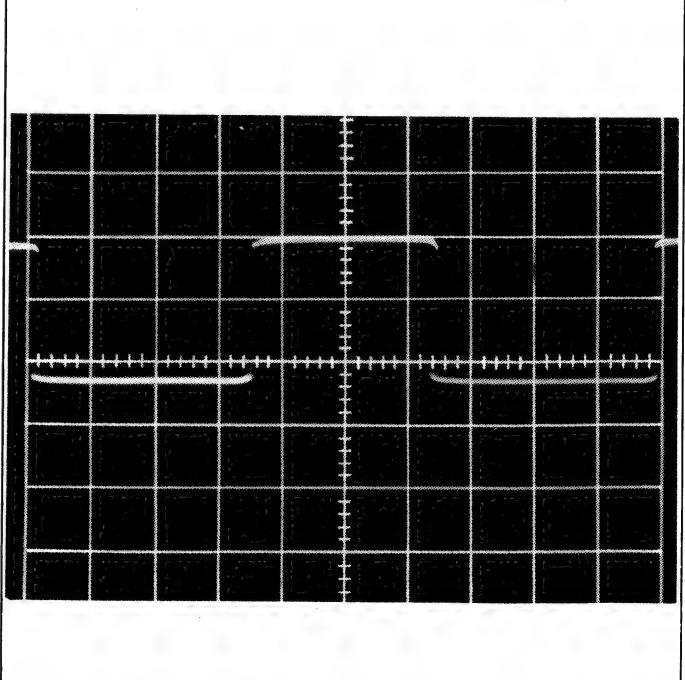
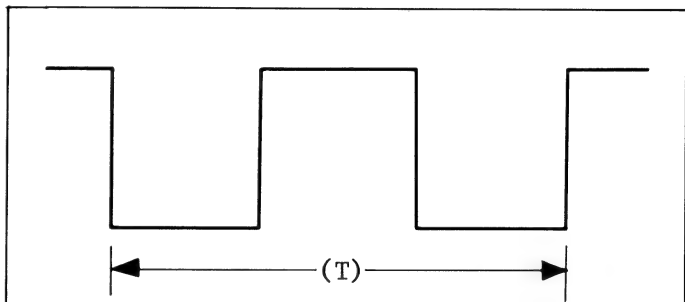


Fig. E28 TP6005 2V/10 μ sec. div.

2-5. TV Demodulator Section

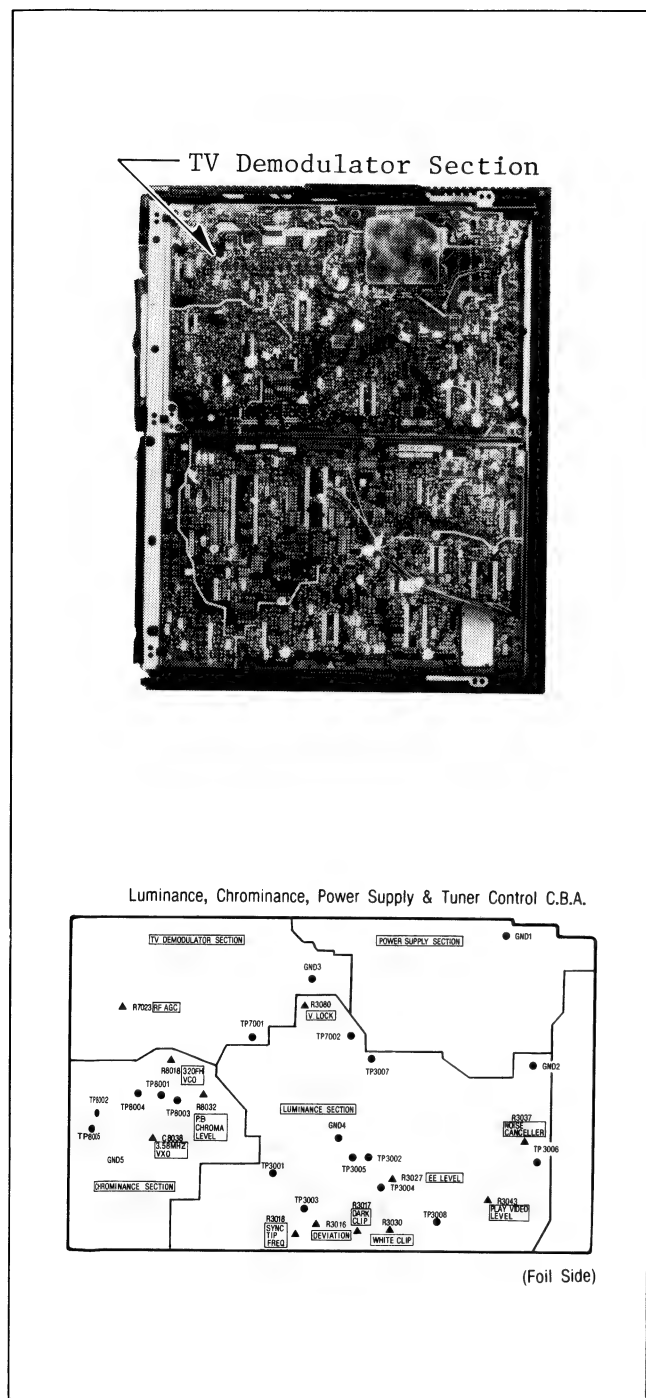


Fig. E29

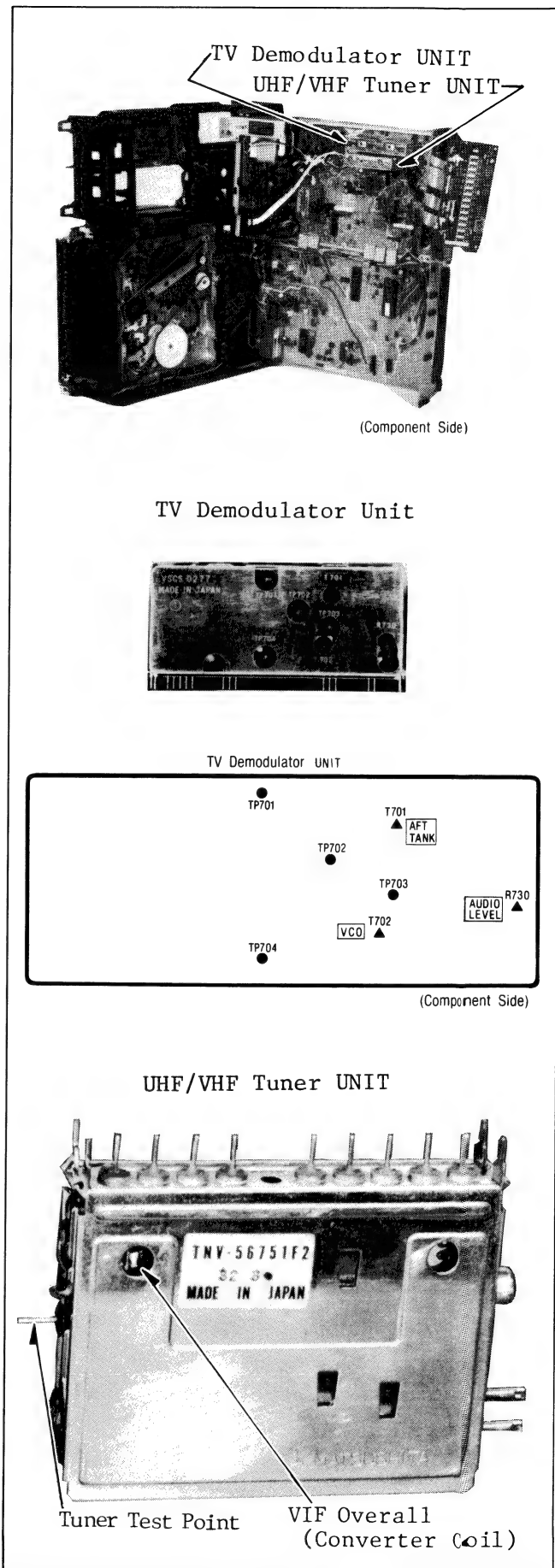


Fig. E30

2-5-1. VIF Overall Adjustment and VCO Adjustment

Test Points: TP704, TP703

Adjustments: T702 (VCO)

Tuner converter coil L13
(VIF Overall ADJ)

(CAUTION)

Since the TV Demodulator unit and UHF/VHF tuner unit have already been factory adjusted, do not try to adjustment unless absolutely necessary.

A: Factory Adjustment

A-1. VIF Overall Adjustment

1. Connect the VIF Sweep Generator, Trap Adjuster and Monitor Scope as shown below.

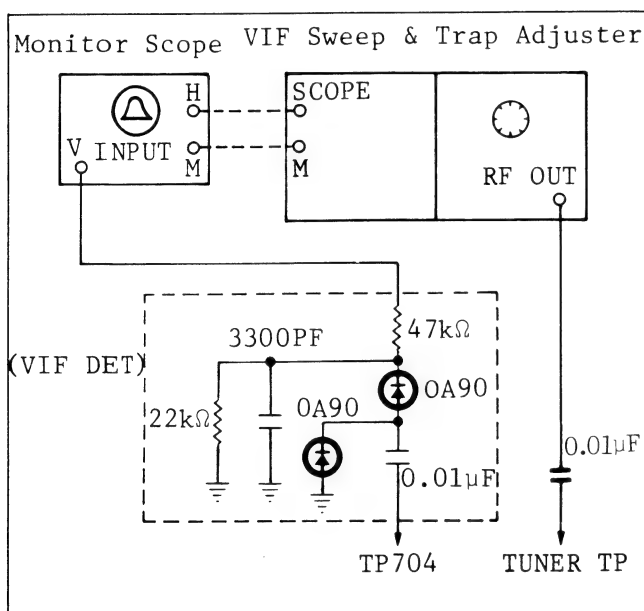


Fig. E31

2. Connect the output of the VIF Sweep Generator to tuner test point on the UHF/VHF tuner unit.
3. Connect the V Input of the Monitor Scope to TP704 on the TV Demodulator unit through VIF Detector.
4. Control to Channel 13.
5. Connect the DC power supply unit to TP701 on the TV Demodulator unit.
6. Connect TP702 and GND with a 3.3μF/25V capacitor.
7. Adjust the VCO (T702) so that the beat portion is at center as shown below.

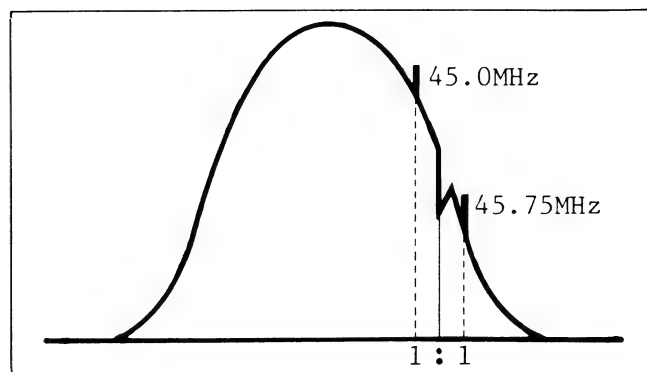


Fig. E32

8. Set the voltage on the TP701 so that the waveform level is maximum.
9. Adjust the output of the VIF Sweep Generator so that the A level is 1.0 Vp-p.

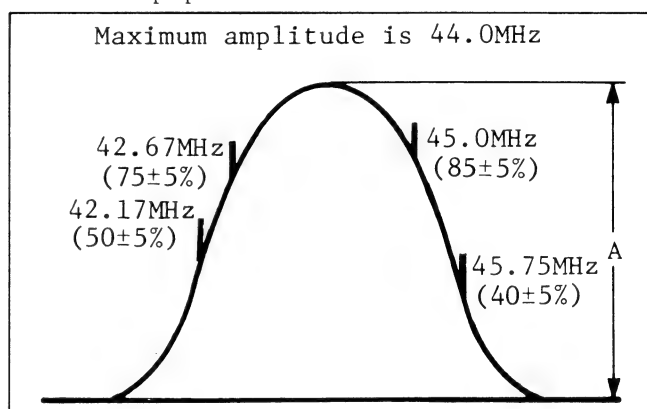


Fig. E33

10. Increase the VIF Sweep Generator output by 25dB.
11. Adjust the output of the DC Power Supply so that the A portion becomes 1.0Vp-p.
12. Adjust the tuner converter coil (L13) UHF/VHF tuner unit so that the sweep output waveform is as shown in Fig. E33.

13. Adjust the VCO (T702) so that the Beat portion is 45.75MHz marker as shown below.
14. Remove the capacitor.

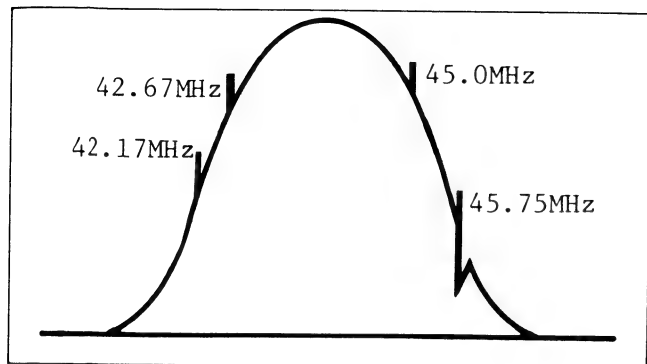


Fig. E34

2. Connect the scope to TP704 on the TV Demodulator unit.
3. Adjust the VCO (T702) so that the waveform is as shown below.

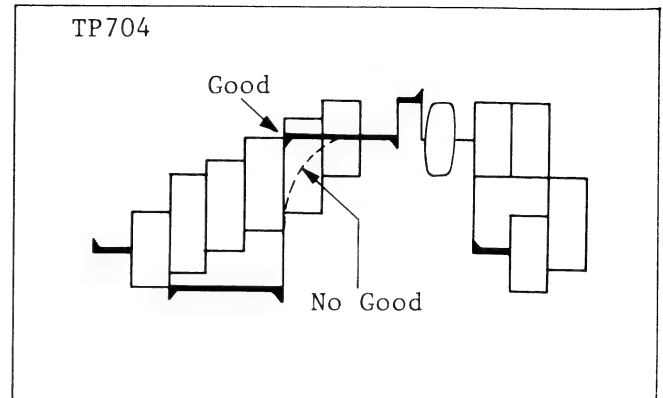


Fig. E36

A-2. VCO Adjustment

1. Adjust the DC power supply output by 0V.
2. Connect a 3.3 μ F/25V capacitor between TP702 and GND.
3. Connect the Frequency Counter to TP703 on the TV Demodulator unit through a Tuning Amp.

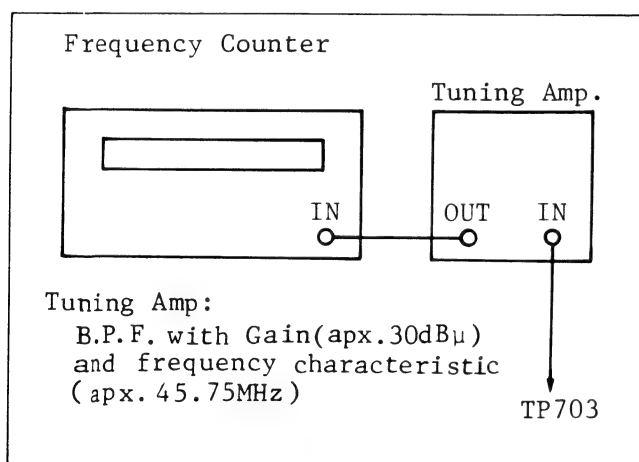


Fig. E35

4. Change the scope from TP704 to pin 6 of TV Demodulator unit.
5. Adjust the VIF Overall (Converter Coil L13) on the UHF/VHF tuner unit so that the burst level is $23 \pm 1\%$ of video level.

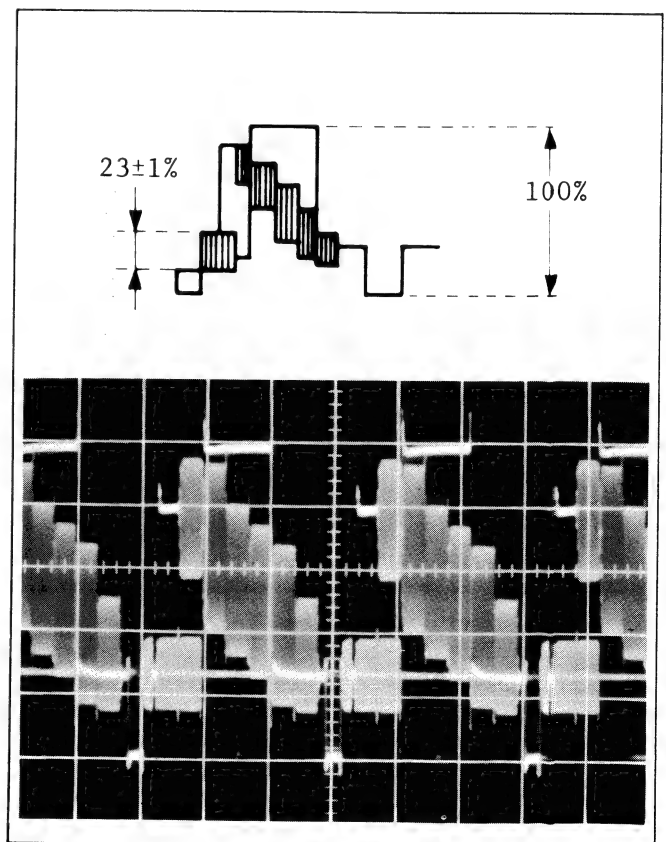


Fig. E37 Pin 6 of TV Demodulator Unit
0.2V/20 μ sec. div.

4. Adjust the VCO (T702) so that the frequency is $45.75\text{MHz} \pm 10\text{kHz}$.
5. Remove the capacitor.

B. Field Adjustment

1. Supply the NTSC standard color bar signal to the RF Input on the rear panel and tune this signal.

2-5-2. AFT Trans Adjustment

Test Point: Tuner Test Point (TP)
Adjustment: T701 (AFT)

1. Tune in a local TV program on Channel 4.
2. Connect the frequency counter to tuner test point on the UHF/VHF tuner unit through a 10k Ω resistor and a 10PF capacitor.

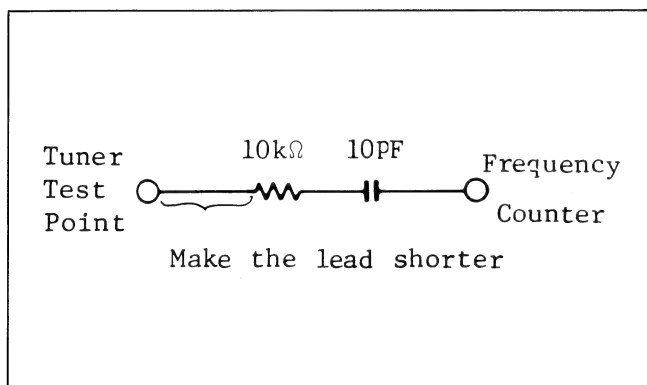


Fig. E38

3. Set the AFT switch on the front panel to "OFF".
4. Adjust the tuning VR on the front panel so that the frequency is 113.00 \pm 0.01MHz.
5. Set the AFT switch on the front panel to "ON".
6. Adjust the AFT (T701) so that the frequency is 113.00 \pm 0.005MHz.
7. Remove the frequency counter.

2-5-3. Audio Level Adjustment

Test Point: Pin 15 of the TV Demodulator unit
Adjustment: R730 (AUDIO LEVEL)

1. Supply TV RF signal with audio modulation of 400Hz at 30% to the RF Input on the rear panel.
2. Connect the scope between pin 15 of the TV Demodulator unit and GND.
3. Adjust the AUDIO LEVEL (R730) so that the level is 133 ^{+20,}
-30mVp-p.

2-5-4. RF AGC Adjustment

Test Point: TP7001
Adjustment: R7023 (RF AGC)

1. Tune in a color bar signal (VHF).
2. Set the AFT switch to "ON" position.
3. Set the input level of electric field to 62 \pm 1dB μ .
(Using the Attenuator and Spectrum Analyzer)
4. Connect the scope to TP7001 on the tuner control section.
5. Turn the RF AGC (R7023) on the tuner control section fully clockwise from foil side.
6. Then slowly turn the RF AGC (R7023) till just before the voltage drops.
7. Change the input electric field from 62dB μ to 65dB μ .
8. Confirm that the voltage at TP7001 has dropped more than 1.0V.

2-6. IR Remote Receiving Detector Section

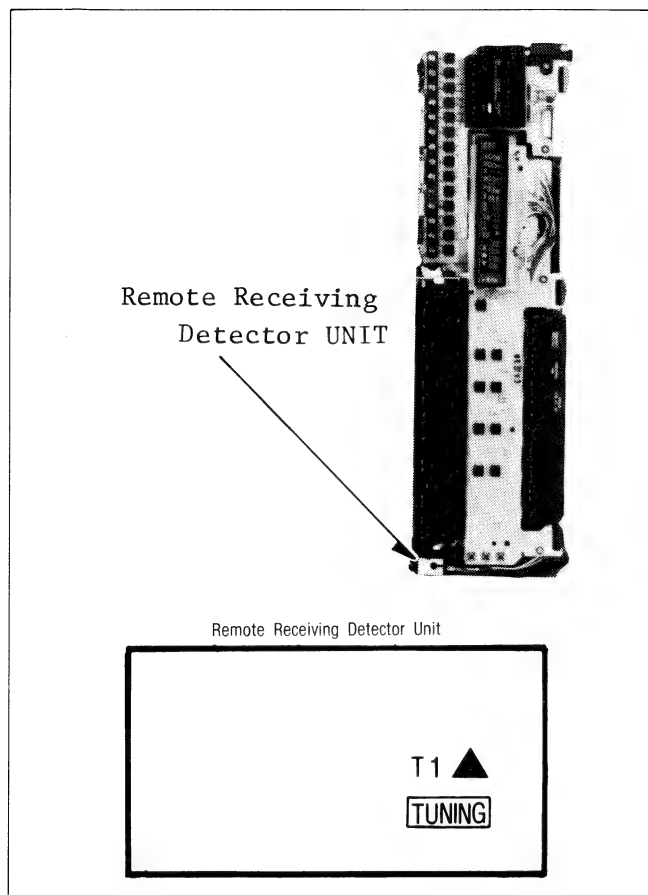


Fig. E39

2-6-1. Tuning Coil Adjustment

Test point: Pin 1 of P6013

Adjustment: T1 (Tuning)

1. Take out a remote receiving detector unit from the unit.

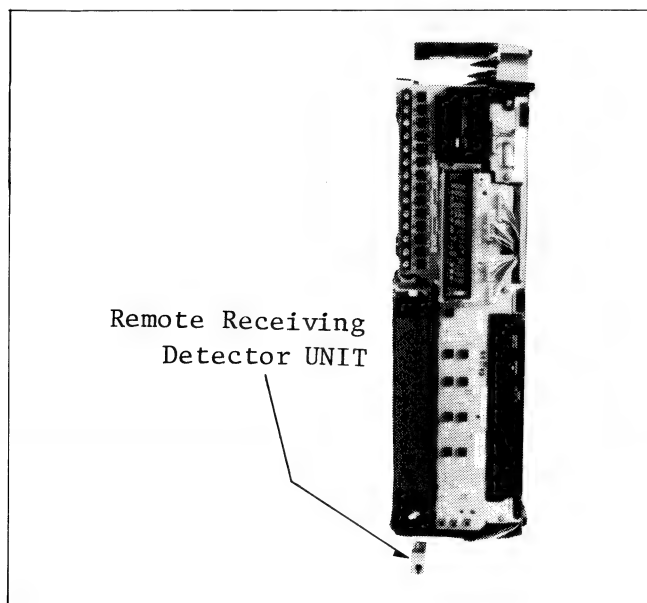


Fig. E40

2. Place the remote controller box and unit as shown in Fig. E41

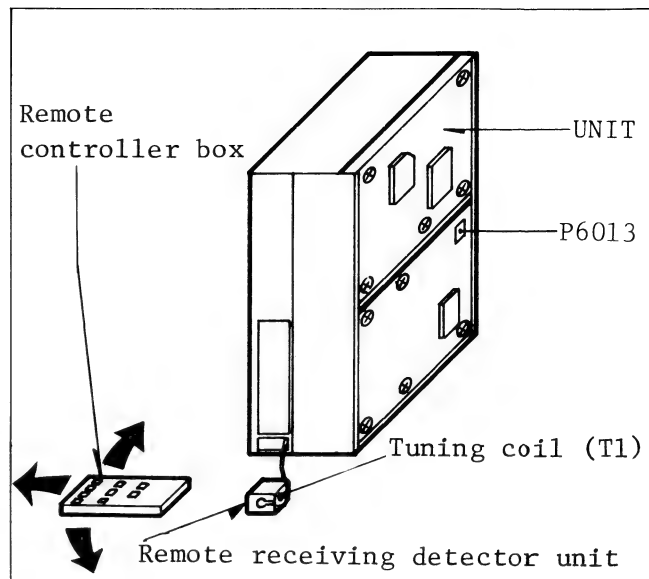


Fig. E41

3. Place the unit in stop mode.
4. Connect the scope to pin 1 of P6013 on the System Control Section.
5. Change the direction of the remote controller box gradually with pushing the stop button on remote control box until the waveform on the scope is just disturbed.

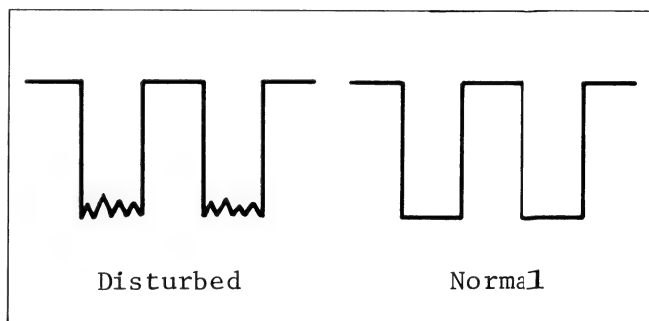


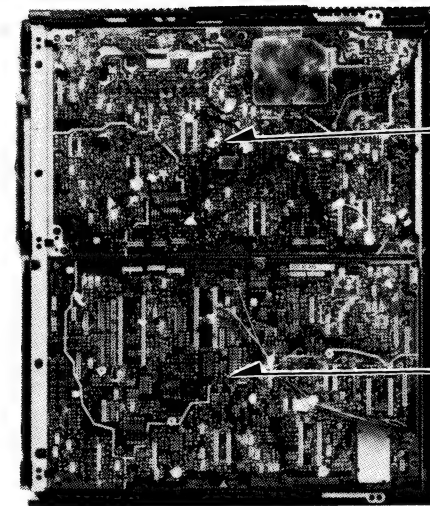
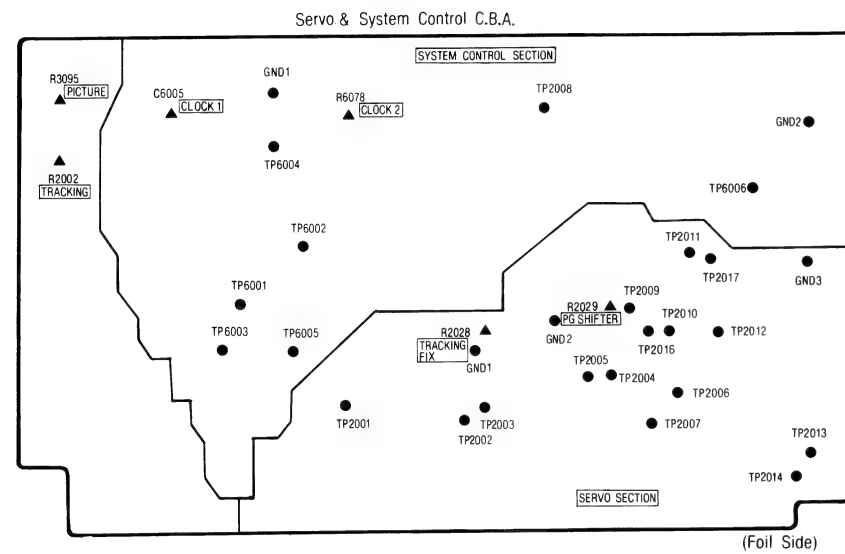
Fig. E42

6. Adjust the Tuning coil (T1) on remote receiving detector unit continuing the condition of item 5 so that the waveform at pin 1 of P6013 is best.
7. Return a remote receiving detector unit to the unit.
8. Remove the scope.

Location of Test Points and Controls

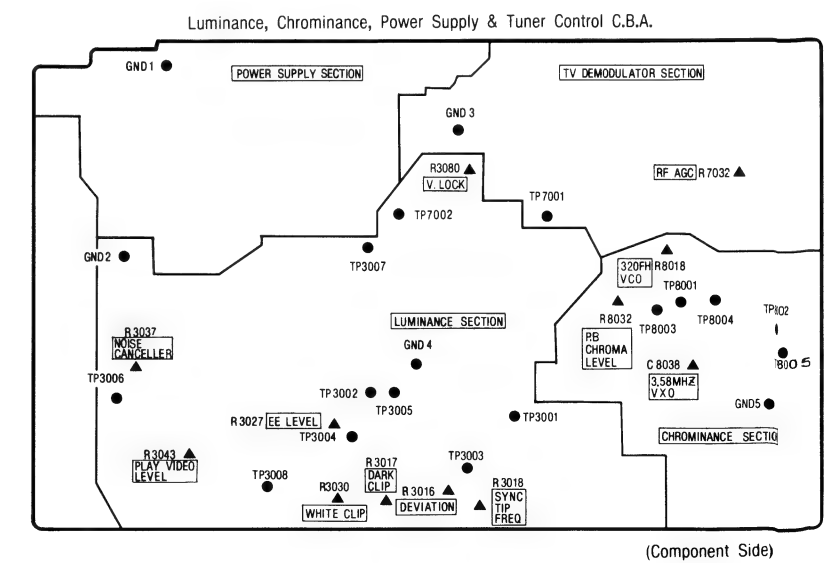
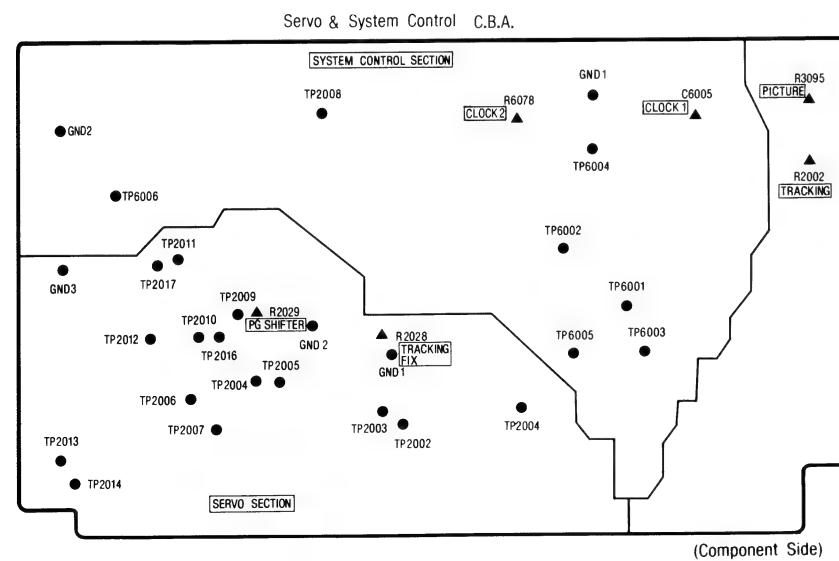
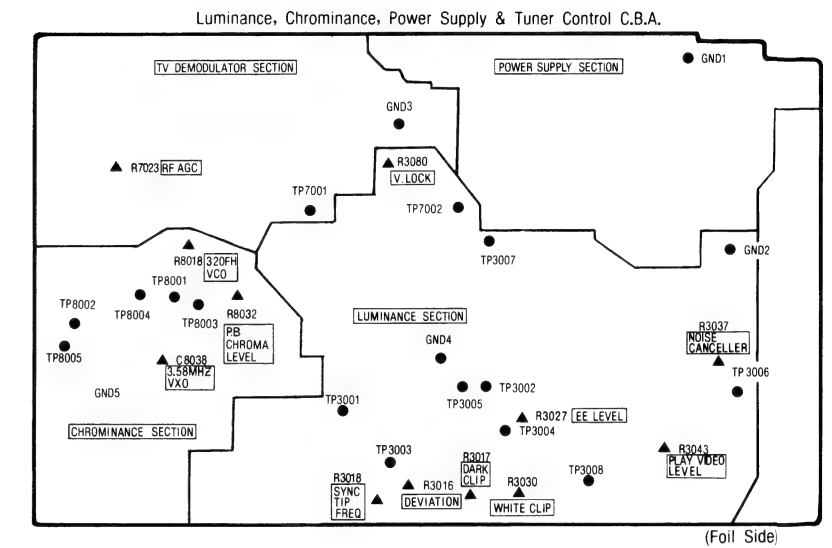
Servo & System Control C.B.A. / Luminance, Chrominance, Power Supply & Tuner Control C.B.A.

VEPS0236 A1/VEPS0328 A1



Luminance, Chrominance,
— Power Supply &
Tuner Control C.B.A.

— Servo & System Control
C.B.A.



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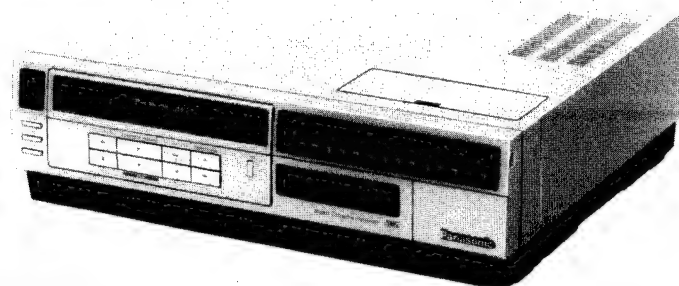
Service Manual

Vol. 3

Video Cassette Recorder

Panasonic
Omnivision **VHS**

Block Diagrams

PV-1520


SPECIFICATIONS

Power Source: 120V AC $\pm 10\%$, 60Hz $\pm 0.5\%$
 Power Consumption: Approx. 24 watts (When the Power switch is OFF, Approx. 11 watts)
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track
 Tape Format: Tape width 1/2" (12.7mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35 mm/s)
 LP mode: 21/32 i.p.s. (16.67 mm/s)
 SLP mode: 7/16 i.p.s. (11.12 mm/s)

Record/Playback Time: 8 HRS. with 160 min. type tape used in SLP mode

FF/REW Time: Less than 6 min. with 120 min. type tape

Heads: Video: 4 rotary heads
 Audio/Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)
 1.0Vp-p, 75 Ω unbalanced

Audio: AUDIO IN Jack (RCA type)
 -20dB, 50k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch13,
 Cable Channels "A"—"W"
 75 Ω unbalanced
 UHF Input: Ch14-Ch83,
 300 Ω balanced

Output Level: Video: VIDEO OUT Jack (RCA type)
 1.0Vp-p, 75 Ω unbalanced
 Audio: AUDIO OUT Jack (RCA type)
 -6dB, 600 Ω unbalanced

RF Modulated: Ch3/Ch4 switchable,
 72dB μ , (Open Voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 230 lines

Audio Frequency

Response: SP mode: 100Hz ~ 8kHz
 (10dB down) LP mode: 100Hz ~ 6kHz
 SLP mode: 100Hz ~ 5kHz

Signal-to-Noise Ratio: Video: SP mode: better than 43dB
 LP mode: better than 41dB
 SLP mode: better than 41dB
 (Rohde & Schwarz noise meter)

Audio: SP mode: better than 42dB
 LP mode: better than 40dB
 SLP mode: better than 40dB

Operating

Temperature: 41°F—104°F (5°C—40°C)
 Operating Humidity: 10%—75%
 Weight: 20.1 lbs. (9.1kg)
 Dimensions: 16-15/16"(W) \times 14-5/16"(D) \times 5-1/8"(H)
 (430mm \times 364mm \times 130mm)

Accessories Supplied:

- Wireless remote control unit
- VHF matching box 75 Ω —300 Ω transformer
- 300 Ω —75 Ω transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable
- Video cassette tape, NV-T60

Available Tapes:

1/2" VHS video cassette tapes
 NV-T160 Approx. 1073ft. (327mm), 160, 320, or 480 min.
 NV-T120 Approx. 810ft. (247mm), 120, 240, or 360 min.
 NV-T60 Approx. 417ft. (127m), 60, 120, or 180 min.

Weight and dimensions shown are approximate. Designs and specifications are subject to change without notice.

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CONTENTS

SPECIFICATIONS	Cover
OVERALL BLOCK DIAGRAM	3- 1
SYSTEM CONTROL BLOCK DIAGRAMS	3- 2
KEY MATRIX	.....	3- 2
IR WIRELESS TRANSMITTER	.....	3- 3
SAFETY FEATURES	.....	3- 3
MODE DISPLAY TUBE	.....	3- 4
DRIVE SIGNAL	.....	3- 4
MODE SELECT SWITCH	.....	3- 5
STOP → PLAY	.....	3- 6
PLAY → STOP	.....	3- 7
STOP → FF	.....	3- 8
FF → STOP	.....	3- 9
REC.PLAY → REC.PAUSE	.....	3-10
REC.PAUSE → REC.PALY	.....	3-11
PLAY → REVIEW	.....	3-12
REVIEW → PLAY	.....	3-13
STOP → EJECT	.....	3-14
MICROPROCESSOR (IC6002) I/O CHART	.....	3-15
MICROPROCESSOR (IC6003) I/O CHART	.....	3-16
SERVO BLOCK DIAGRAM	.....	3-17
HEAD AMP BLOCK DIAGRAM	.....	3-18
LUMINANCE & CHROMINANCE BLOCK DIAGRAM	.....	3-19
AUDIO BLOCK DIAGRAM	.....	3-20
TV DEMODULATOR BLOCK DIAGRAM	.....	3-21
RF CONVERTER BLOCK DIAGRAM	.....	3-22

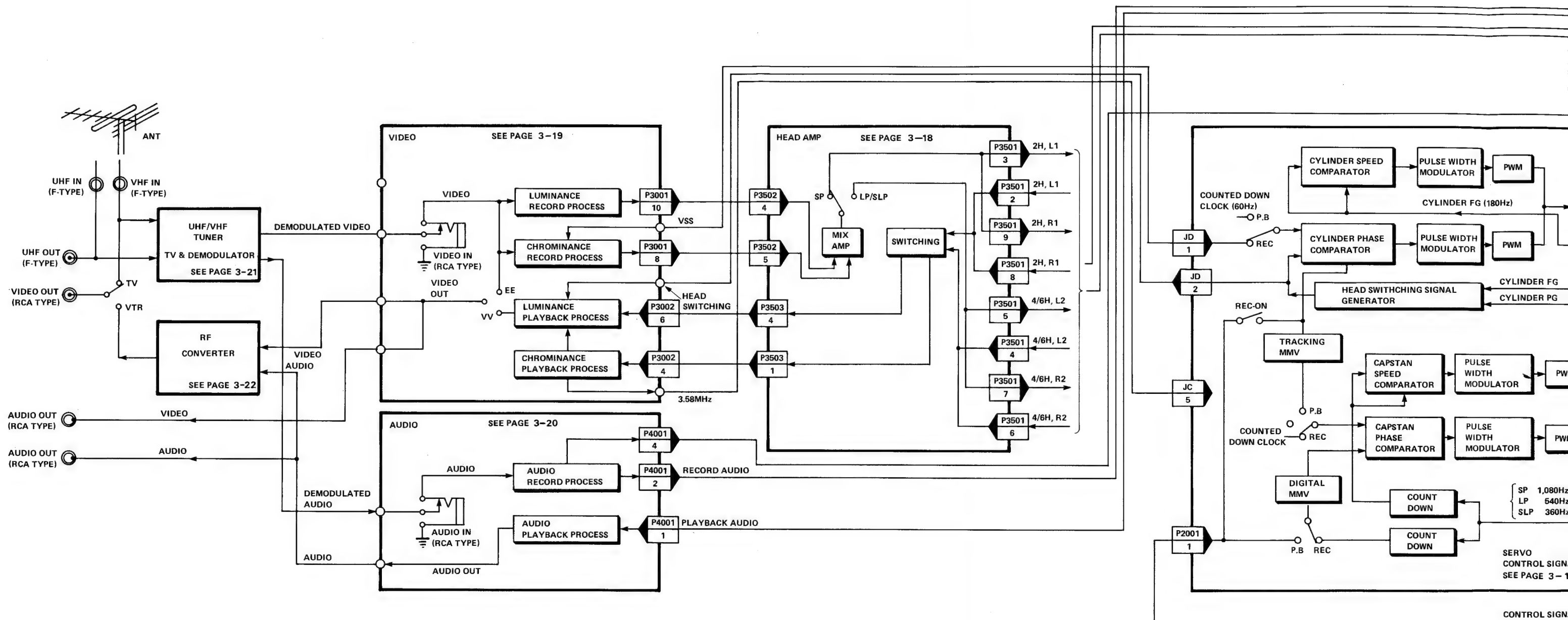
ABBREVIATIONS

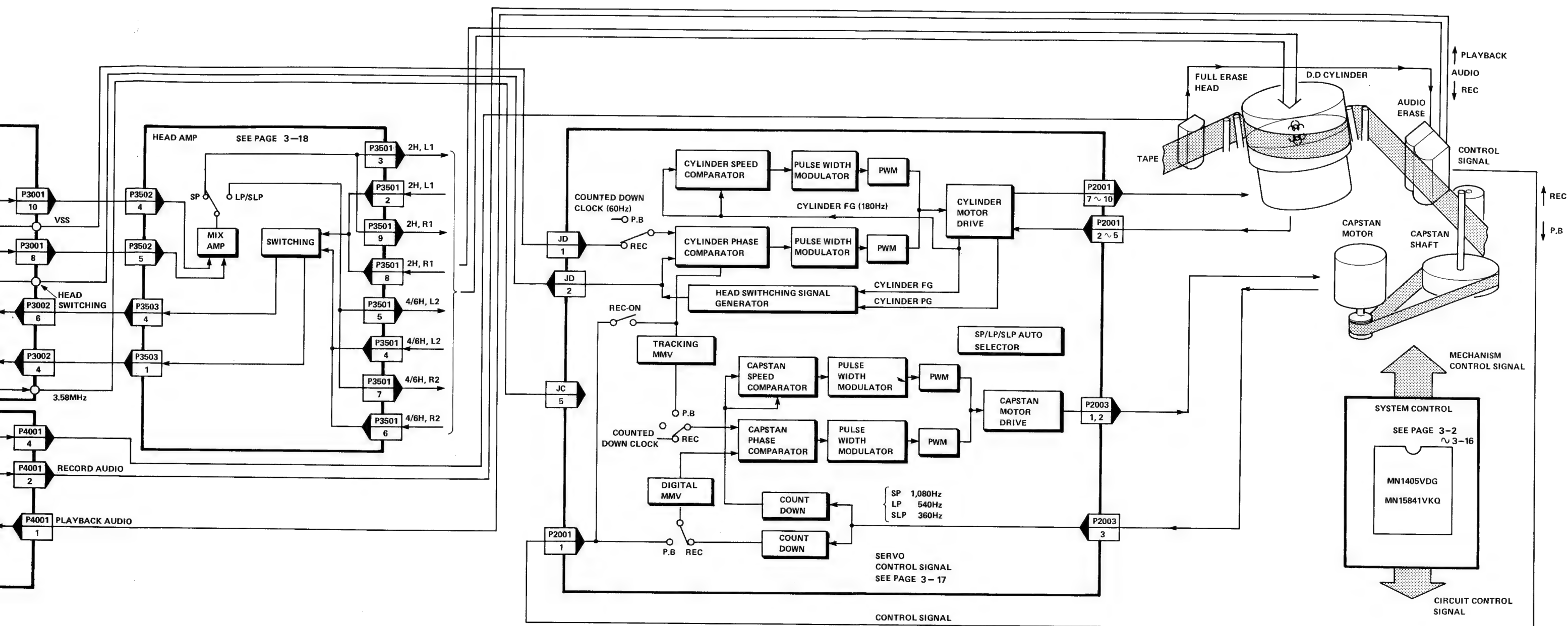
ACC	: Automatic Color Gain Control	LPF	: Low Pass Filter
AFC	: Automatic Frequency Control	MMV	: Monostable Multi Vibrator
AGC	: Automatic Gain Control	OSC	: Oscillator
AMP	: Amplifier	PWM	: Pulse Width Modulation
APC	: Automatic Phase Control	SEP	: Separator
BPF	: Band Pass Filter	VCO	: Voltage Controlled Oscillator
DIFF AMP	: Differential Amplifier	VSS	: Vertical Sync Signal
DOC	: Drop Out Compensation	VXO	: Voltage Controlled Crystal Oscillator
FF	: Flip Flop		
HPF	: High Pass Filter		

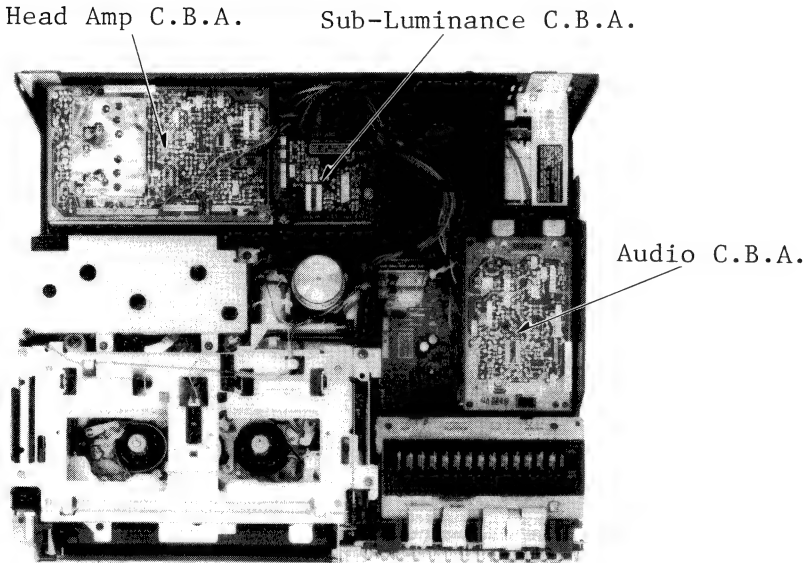
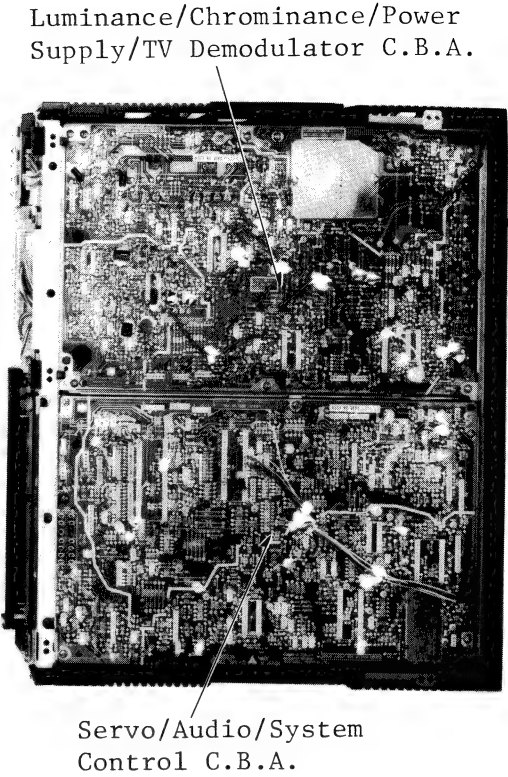
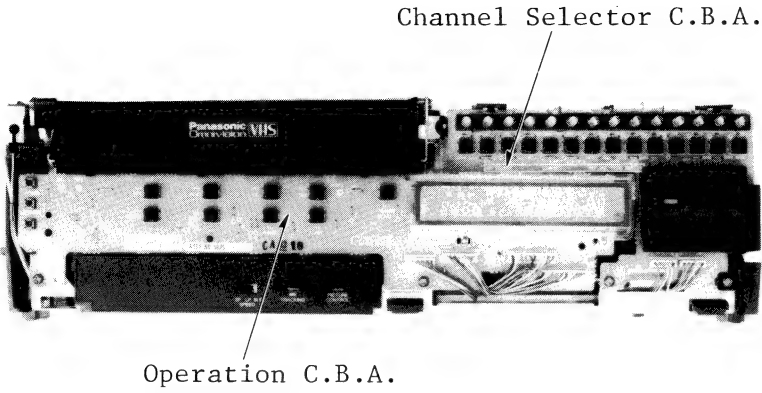
NOTICE

- In order to operate the unit without a tape, make the following connections.
1. Push the Slot SW on the cassette up unit (Slot SW turns ON).
 2. Push the cassette Holder.
 3. Connect a jumper between TP6006 and GND.
 4. Connect a jumper between TP2006 and TP6002. Above test points are located on the Servo, Audio & System Control board.

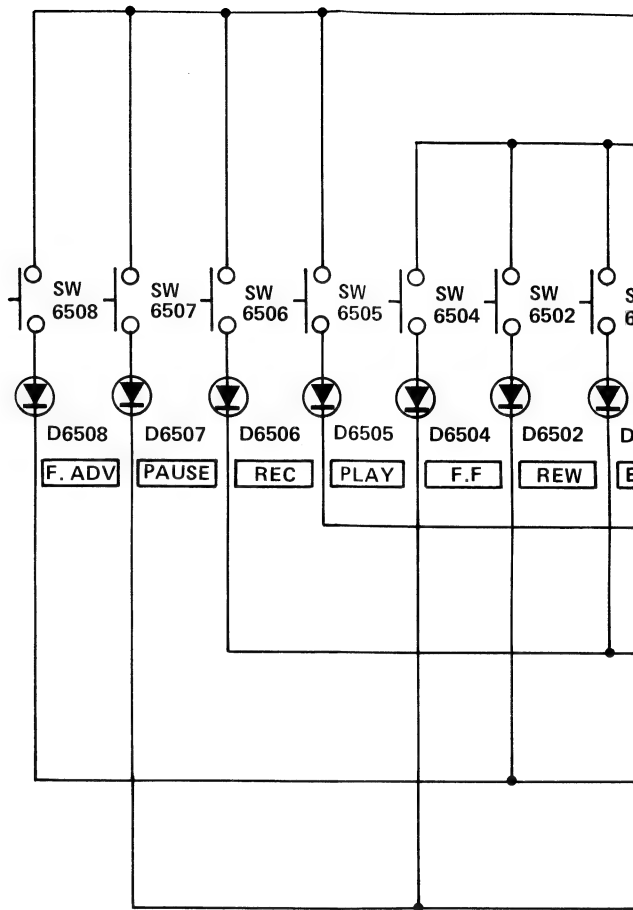
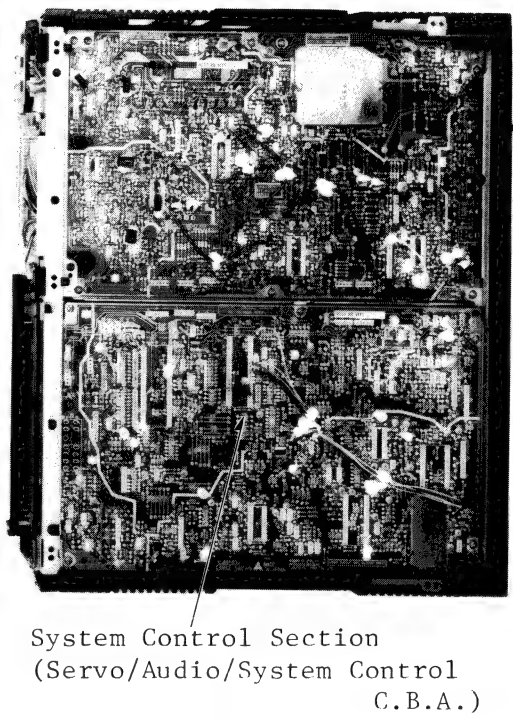
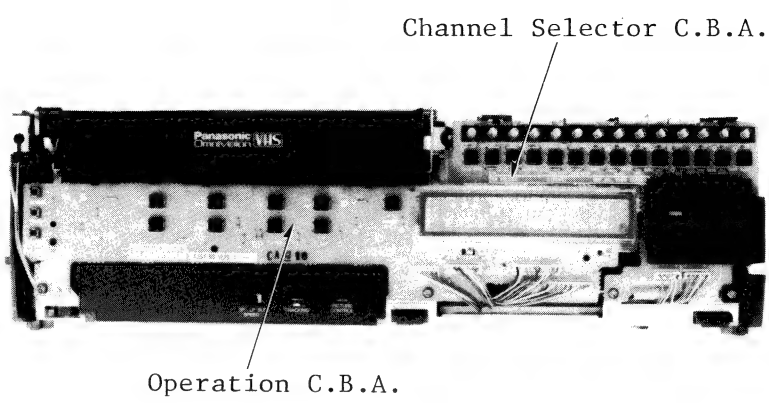
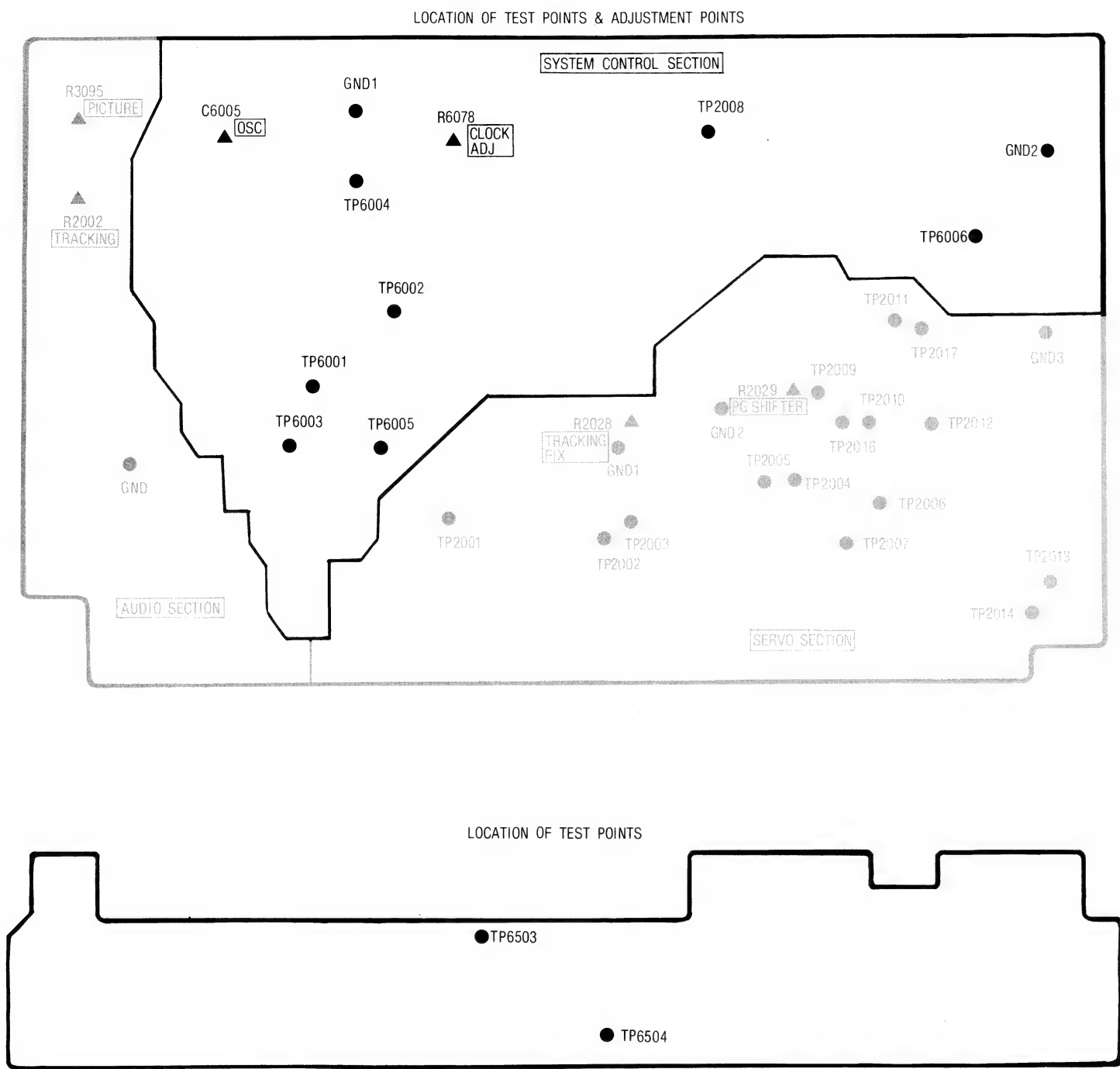
OVERALL BLOCK DIAGRAM



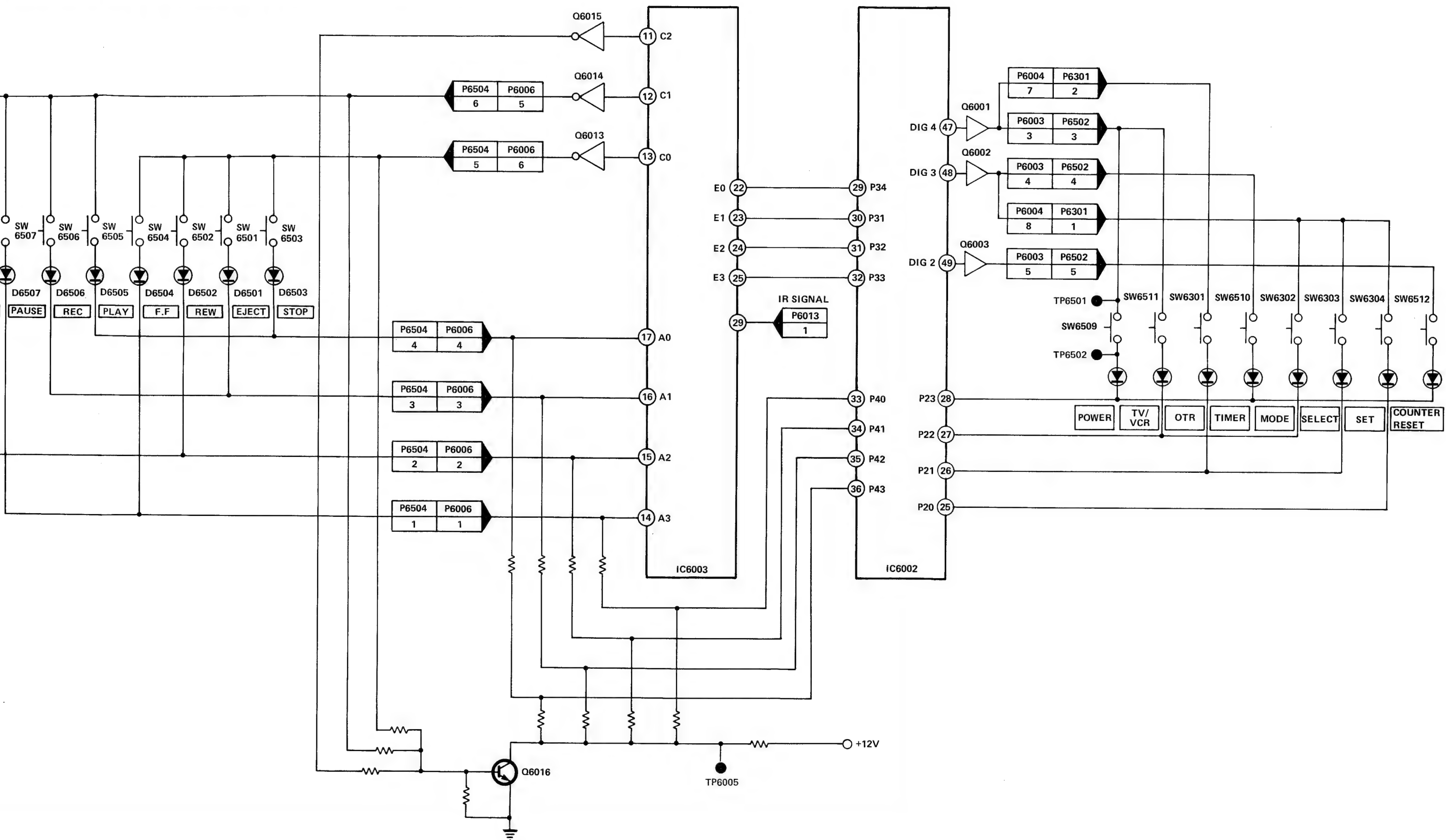




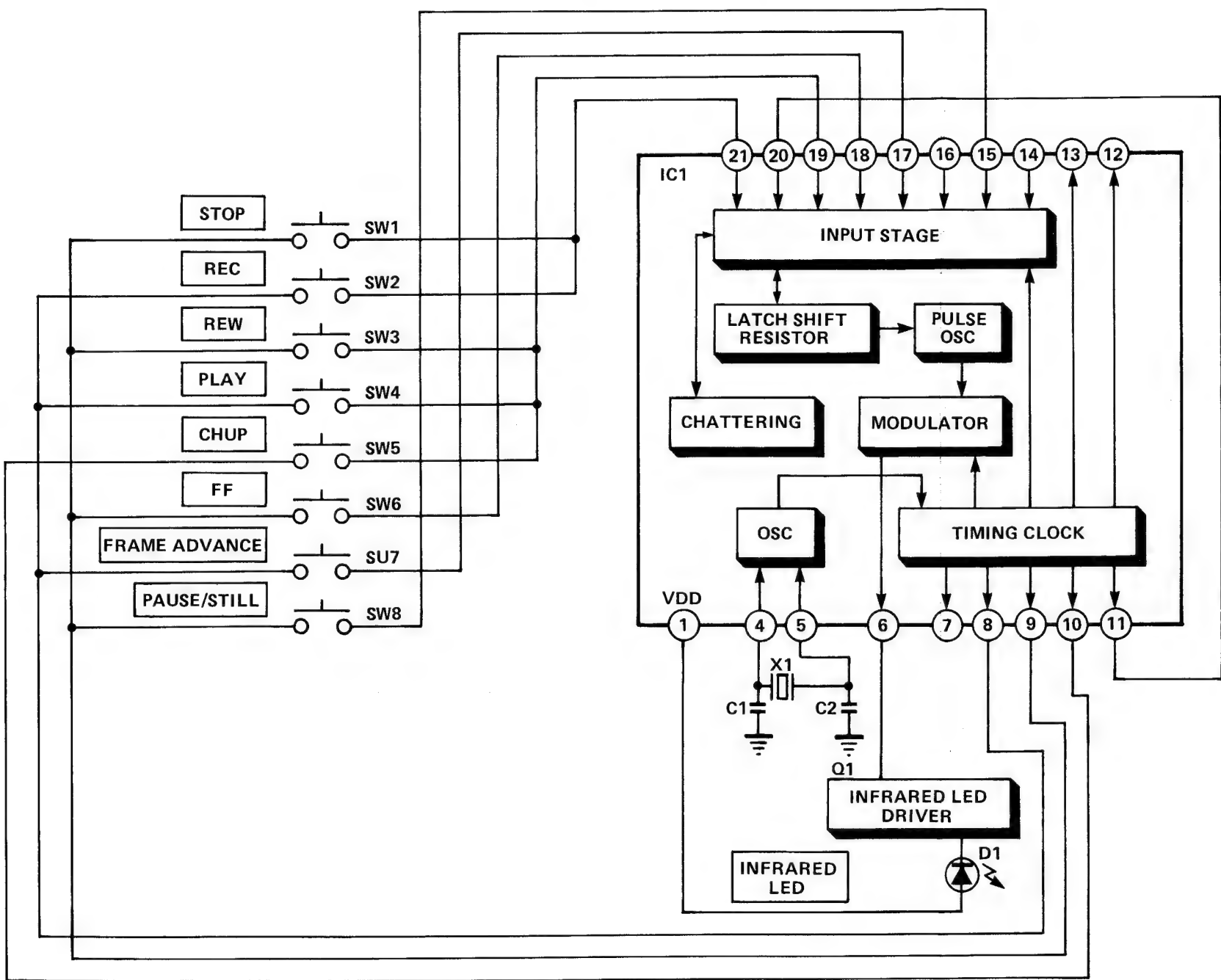
KEY MATRIX BLOCK DIAG



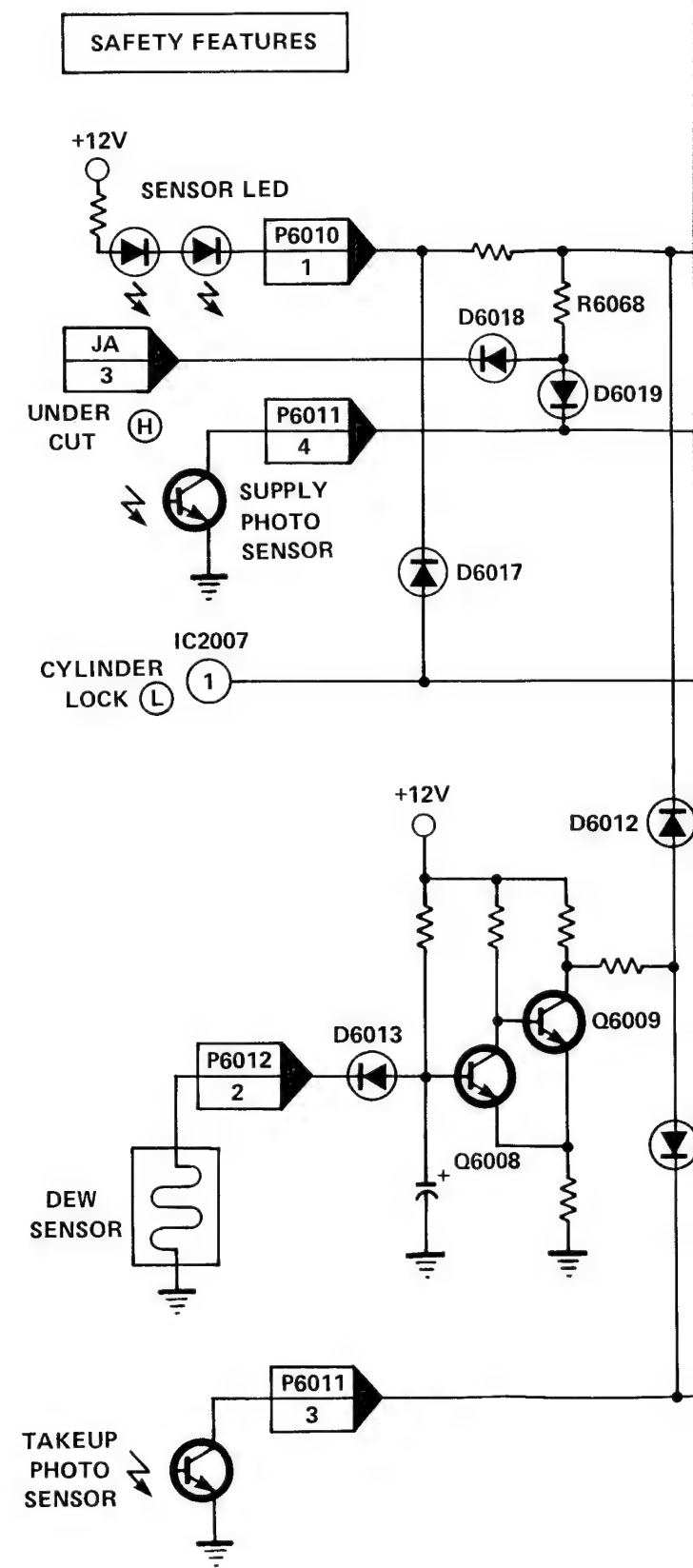
7 MATRIX BLOCK DIAGRAM (SYSTEM CONTROL)



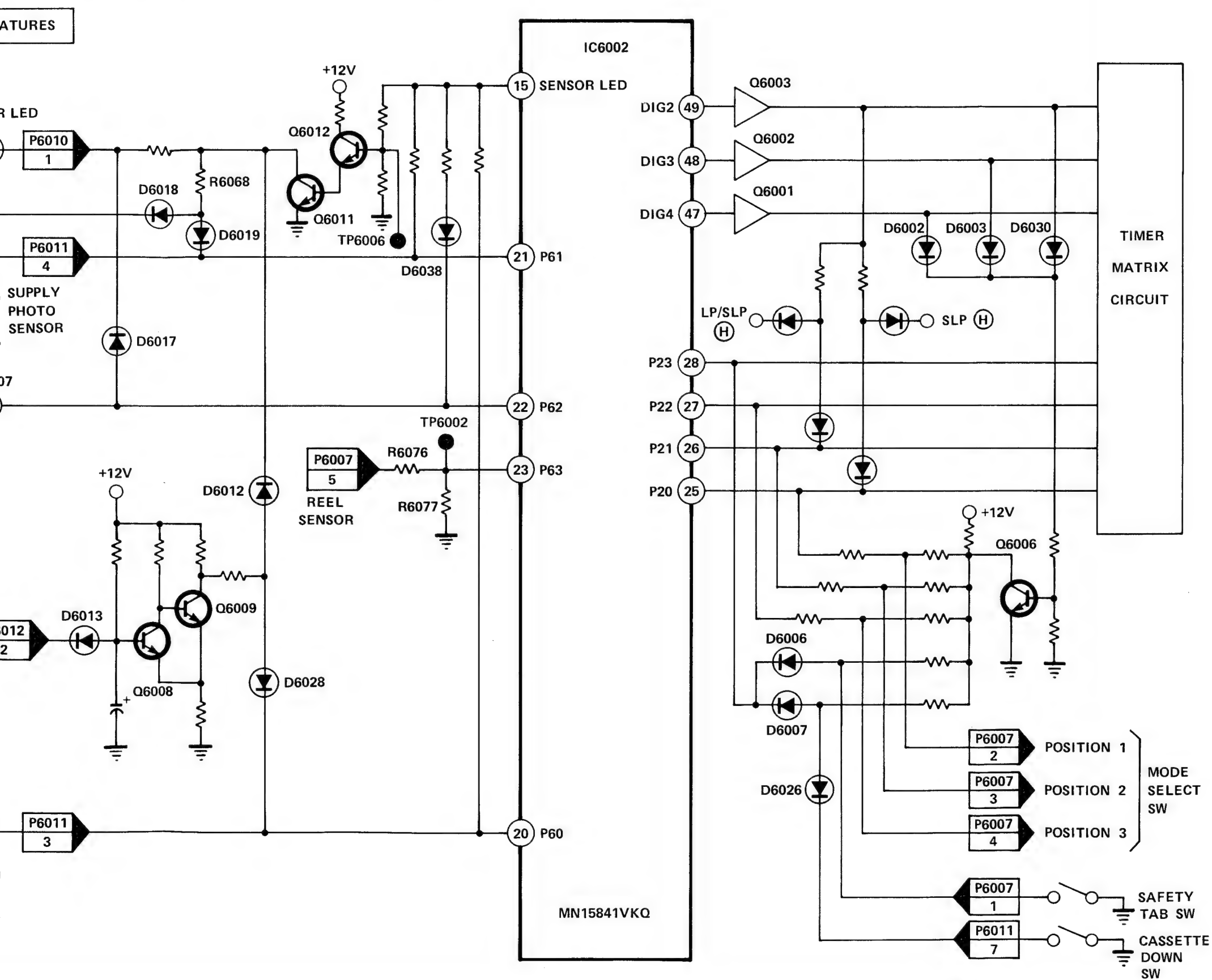
IR WIRELESS TRANSMITTER BLOCK DIAGRAM (SYSTEM CONTROL)



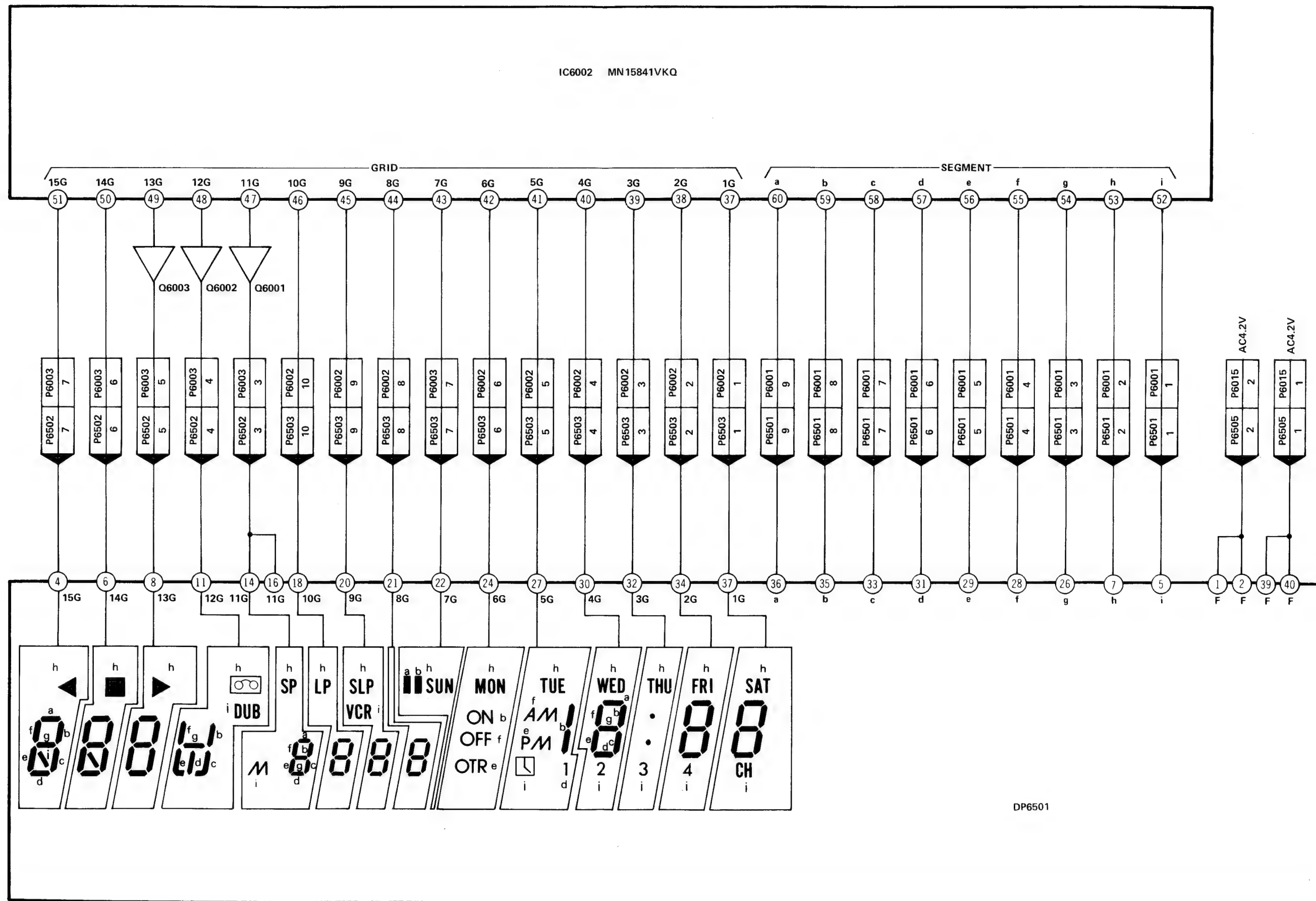
SAFETY FEATURES BLOCK DI



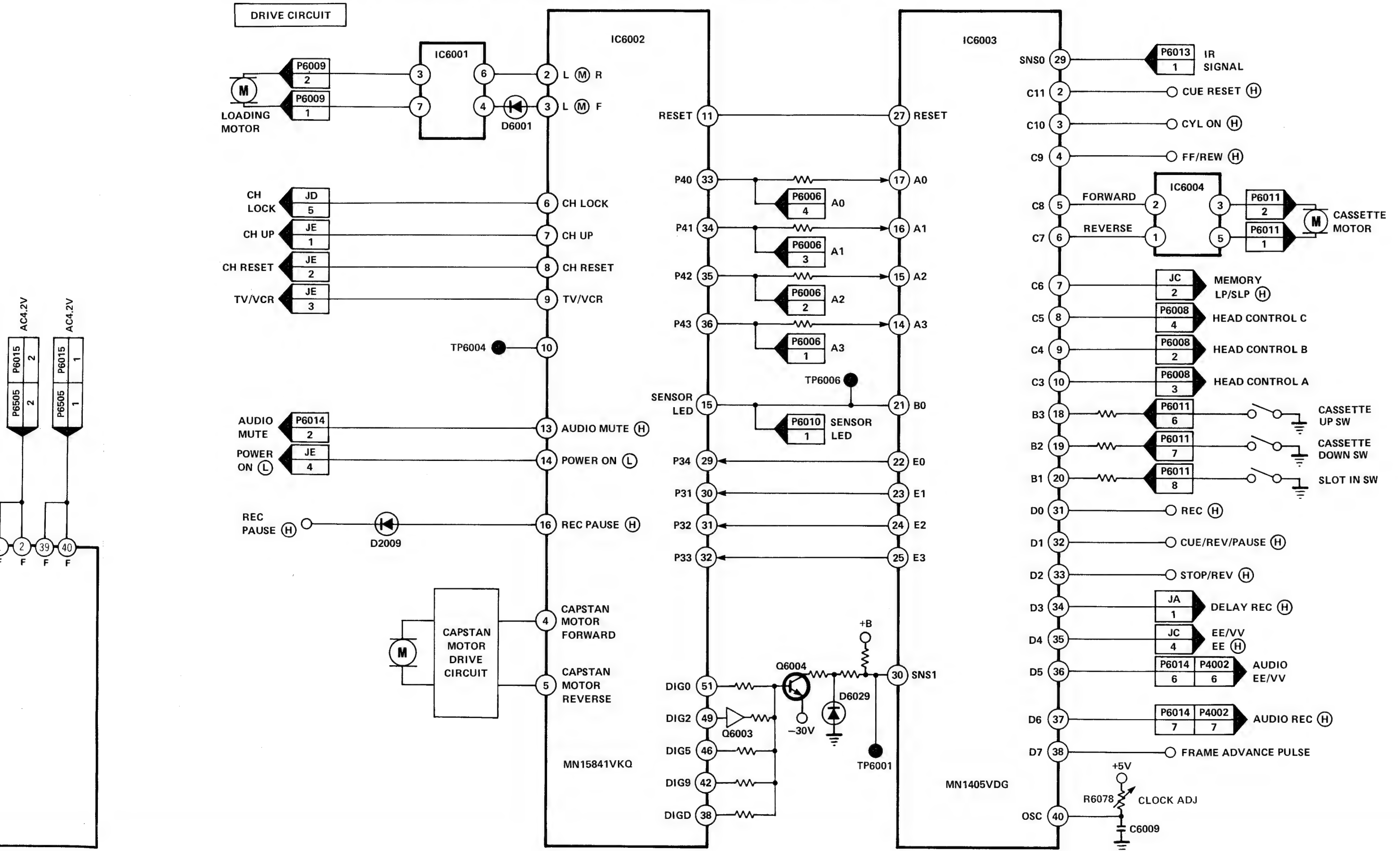
FEATURES BLOCK DIAGRAM (SYSTEM CONTROL)



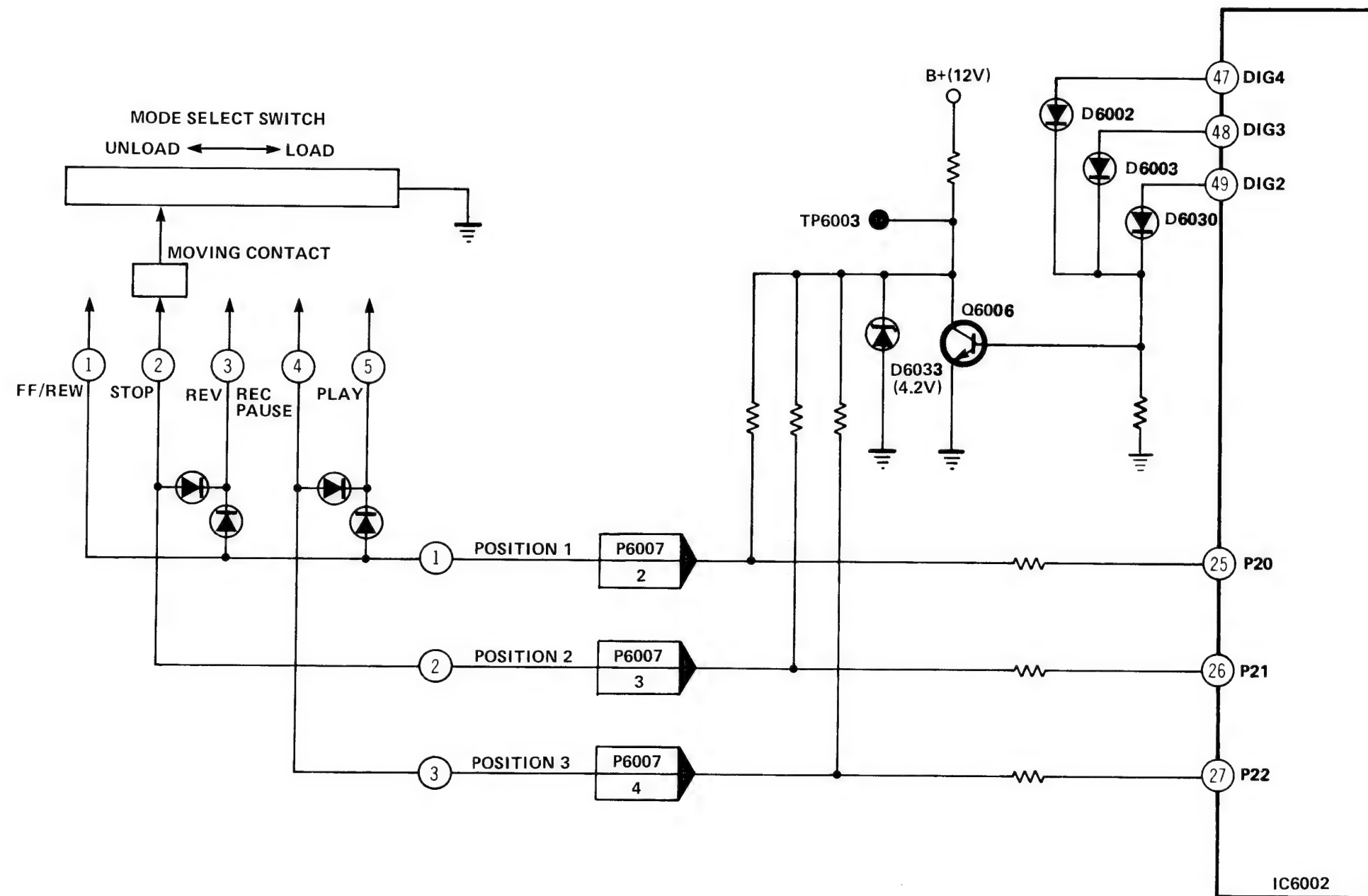
MODE DISPLAY TUBE DRIVE BLOCK DIAGRAM (SYSTEM CONTROL)



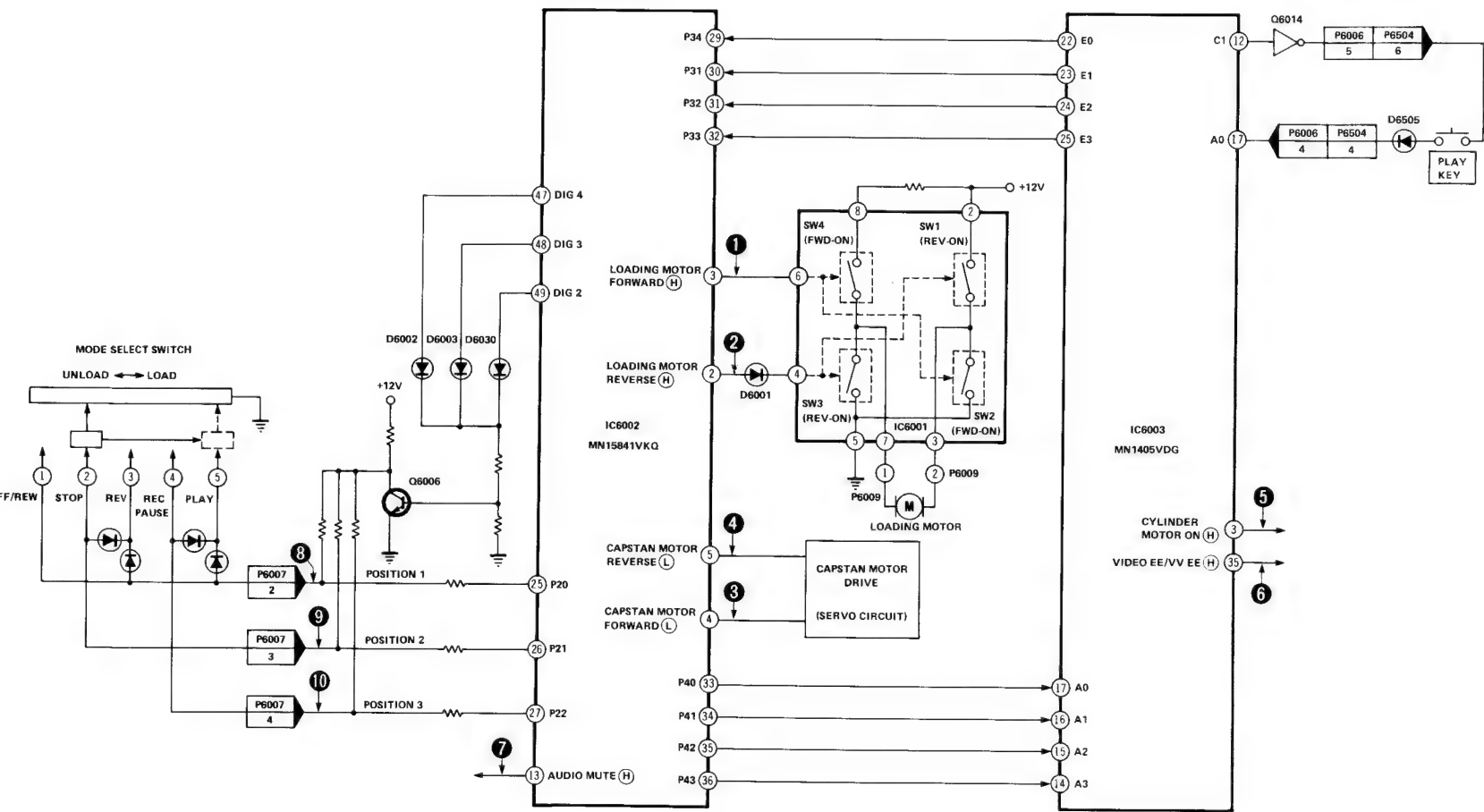
DRIVE SIGNAL BLOCK DIAGRAM (SYSTEM CONTROL)



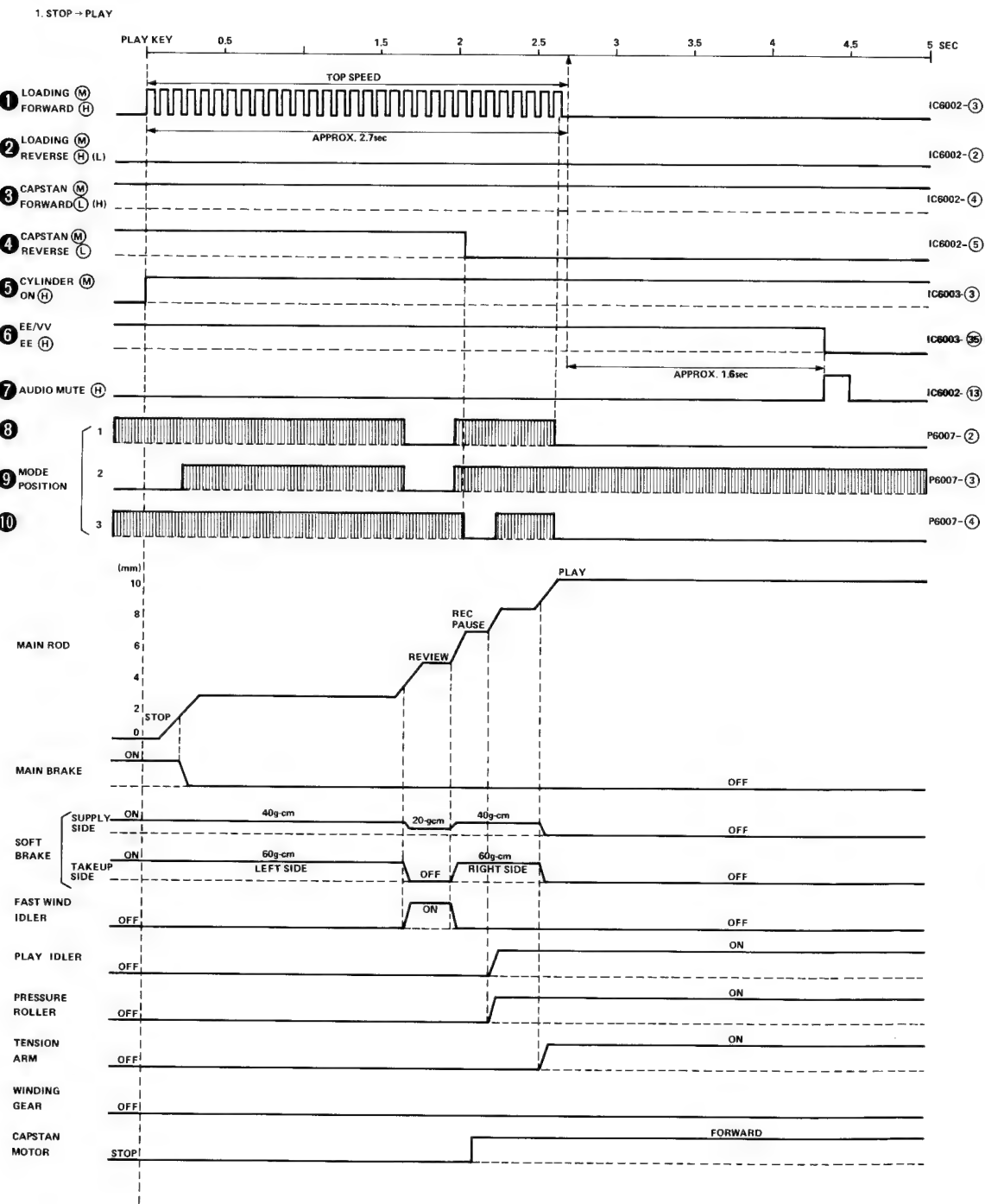
MODE SELECT SWITCH BLOCK DIAGRAM



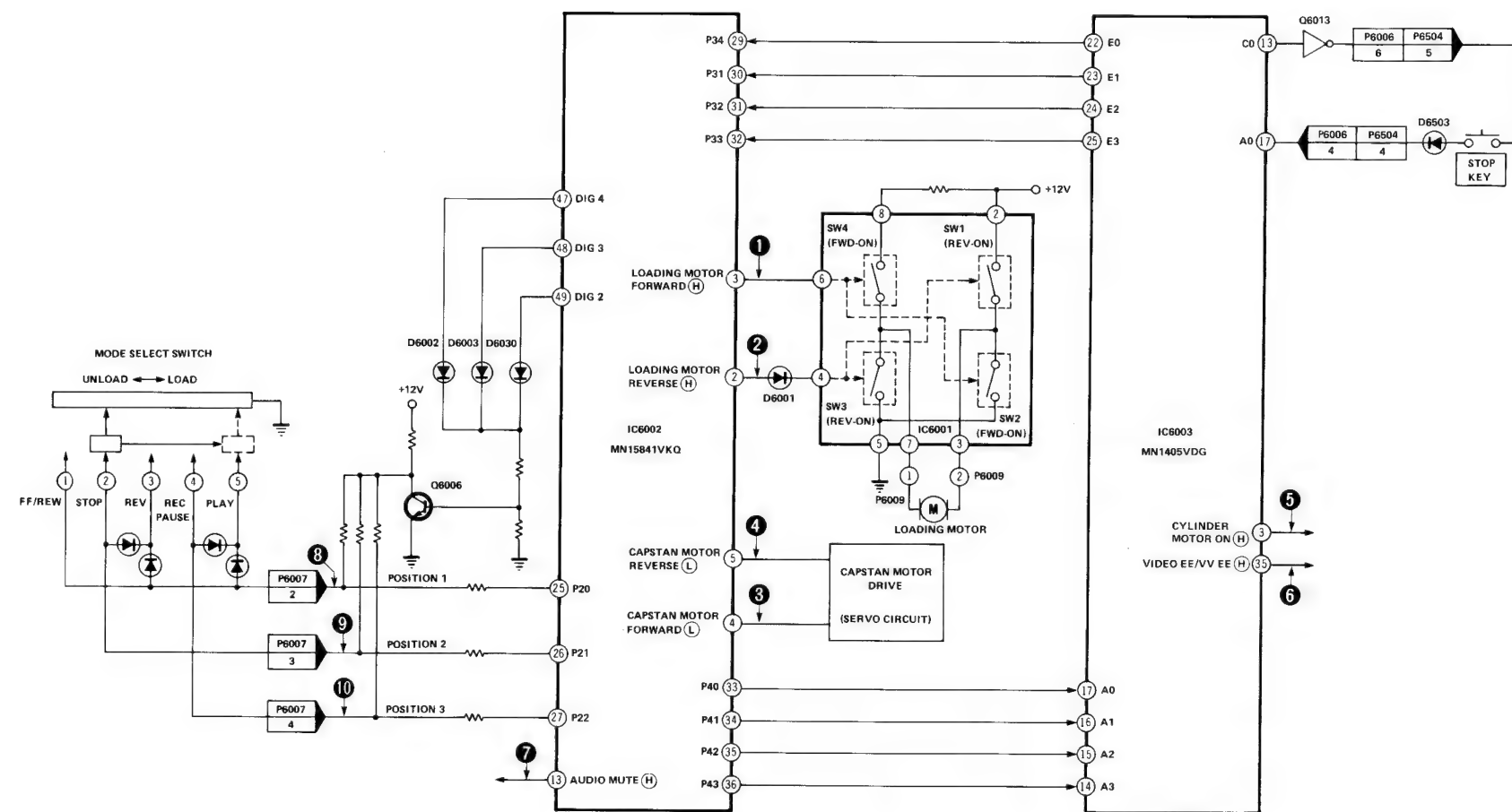
STOP → PLAY BLOCK DIAGRAM (SYSTEM CONTROL)



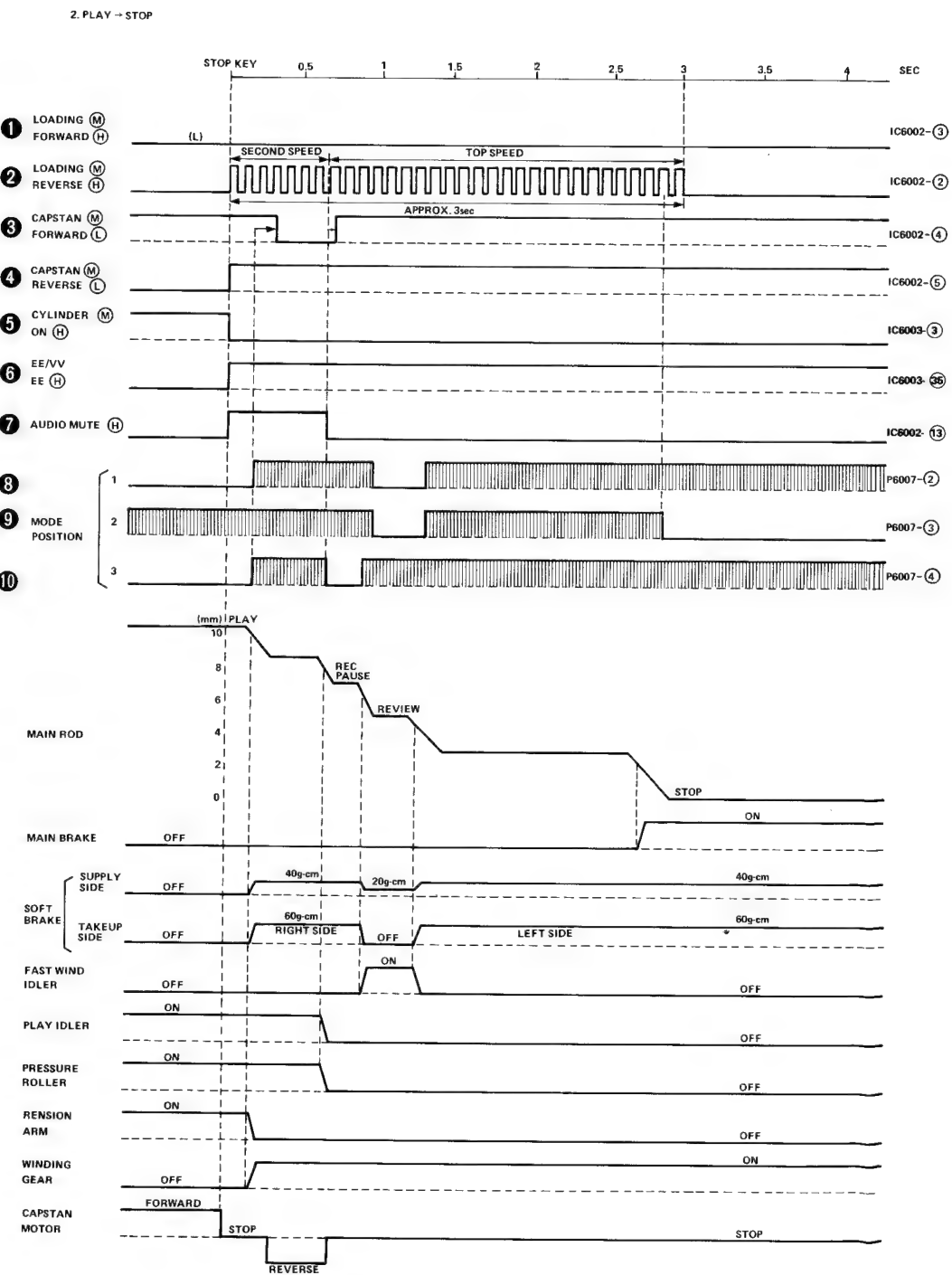
STOP → PLAY MODE TIMING CHART



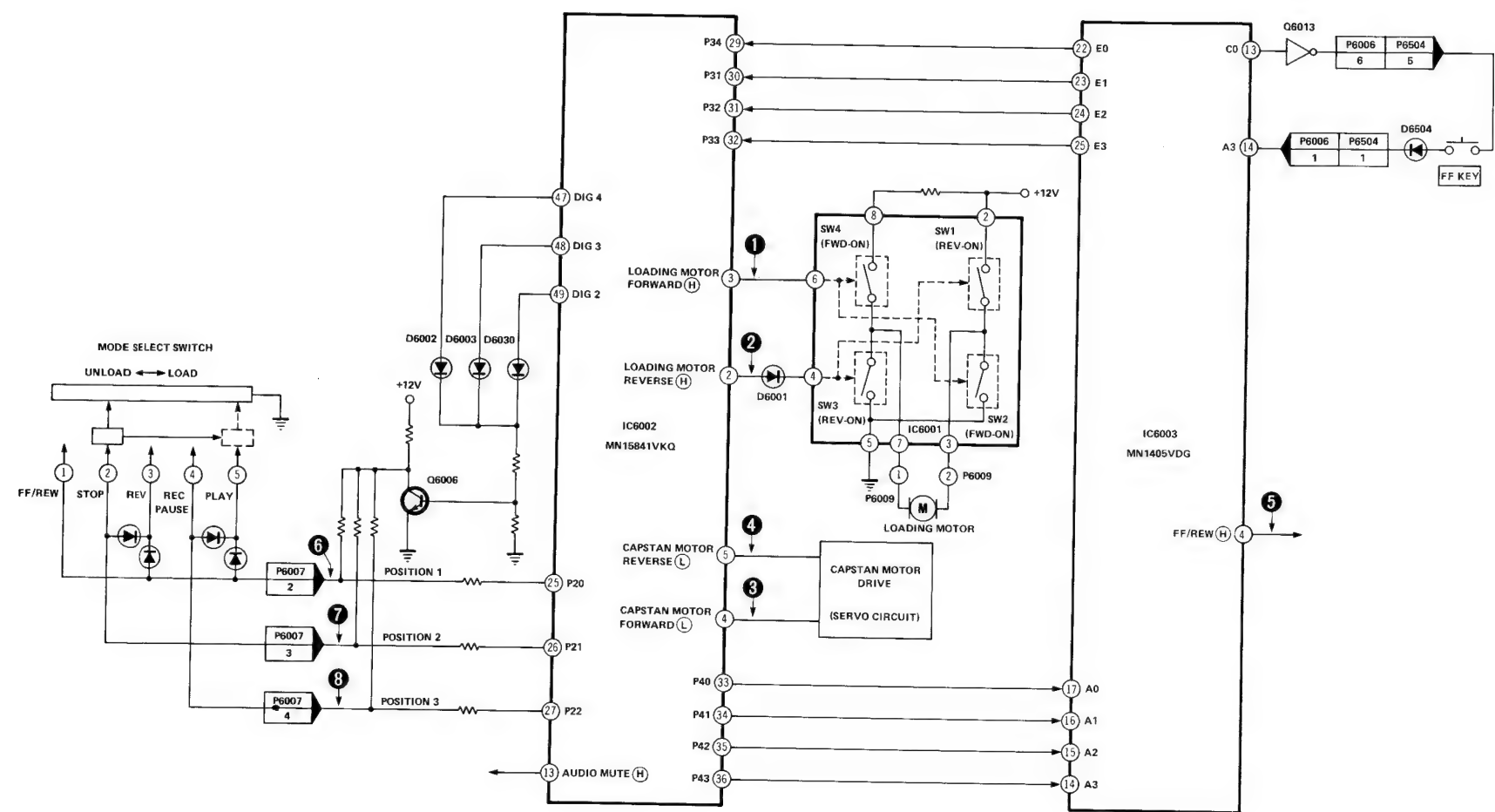
PLAY → STOP BLOCK DIAGRAM (SYSTEM CONTROL)



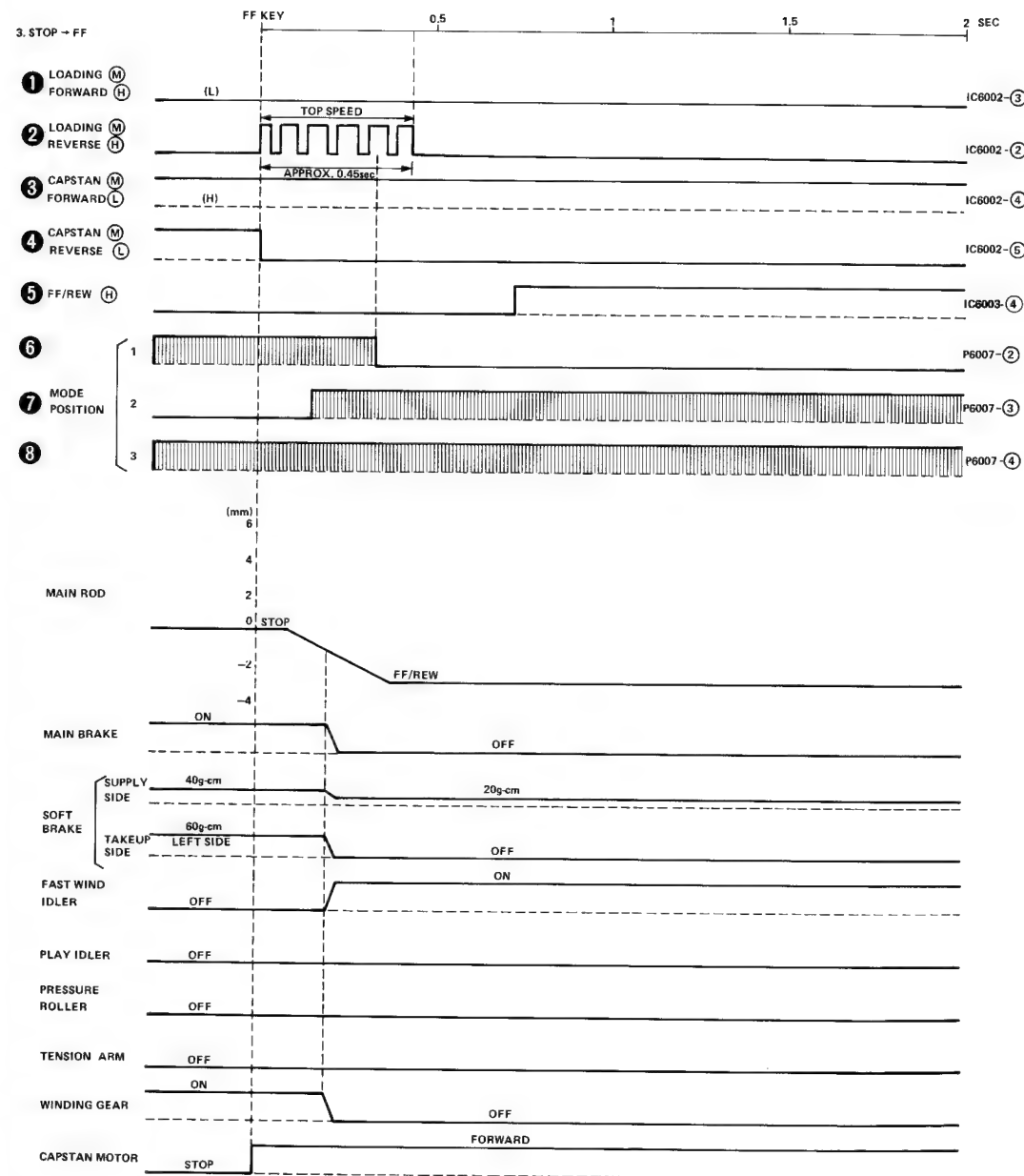
PLAY → STOP MODE TIMING CHART



STOP → FF BLOCK DIAGRAM (SYSTEM CONTROL)

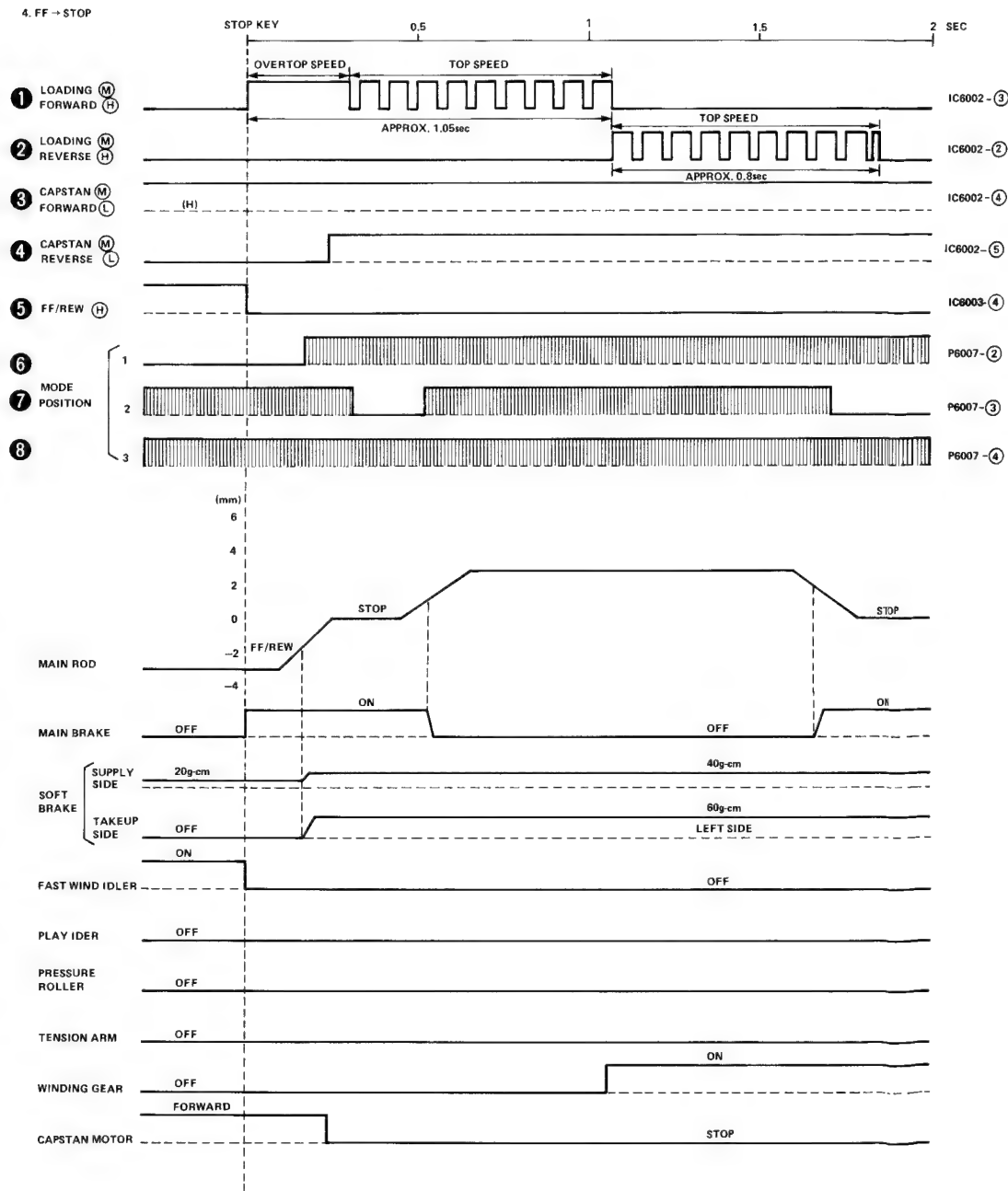
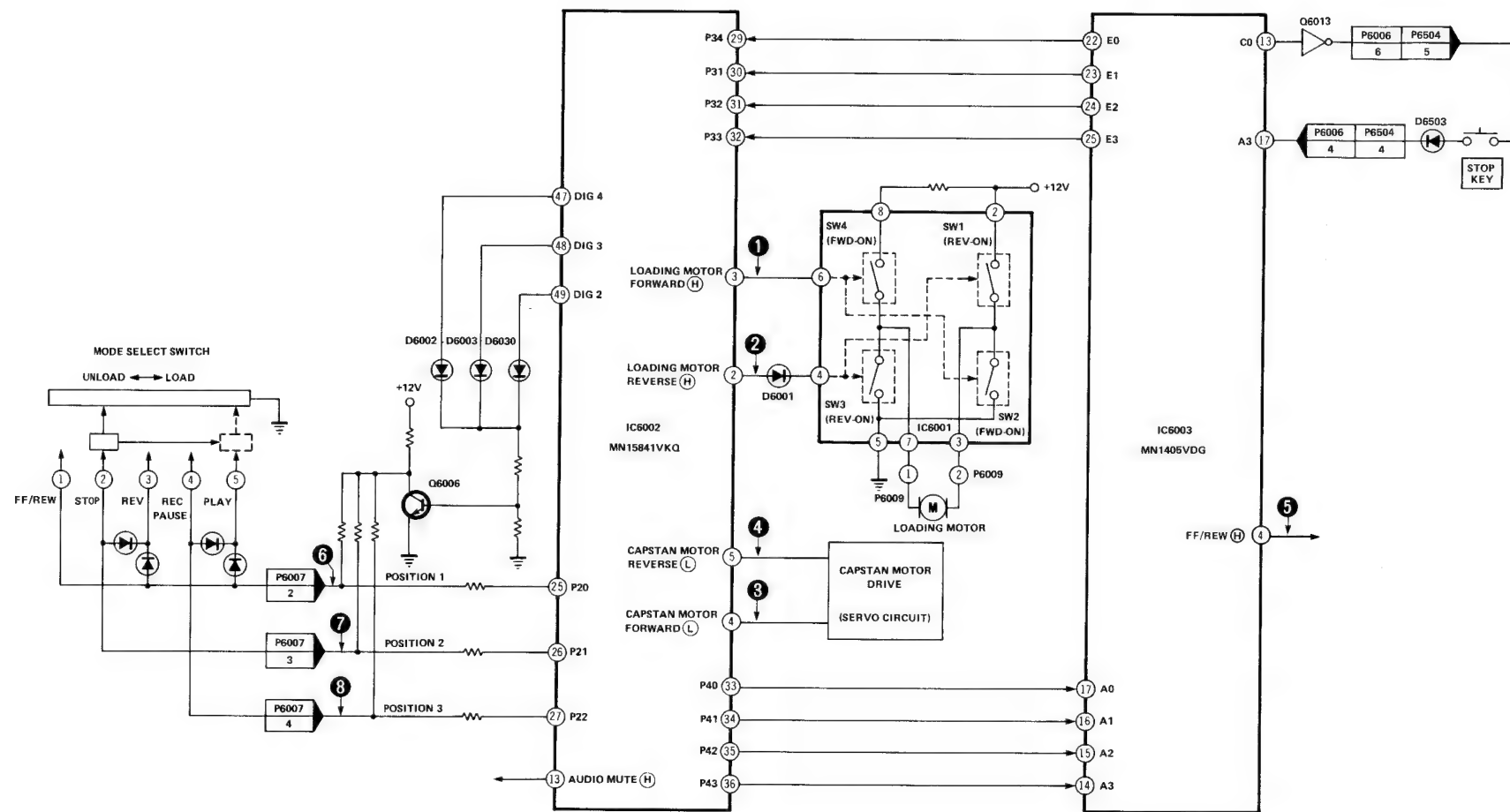


STOP → FF MODE TIMING CHART

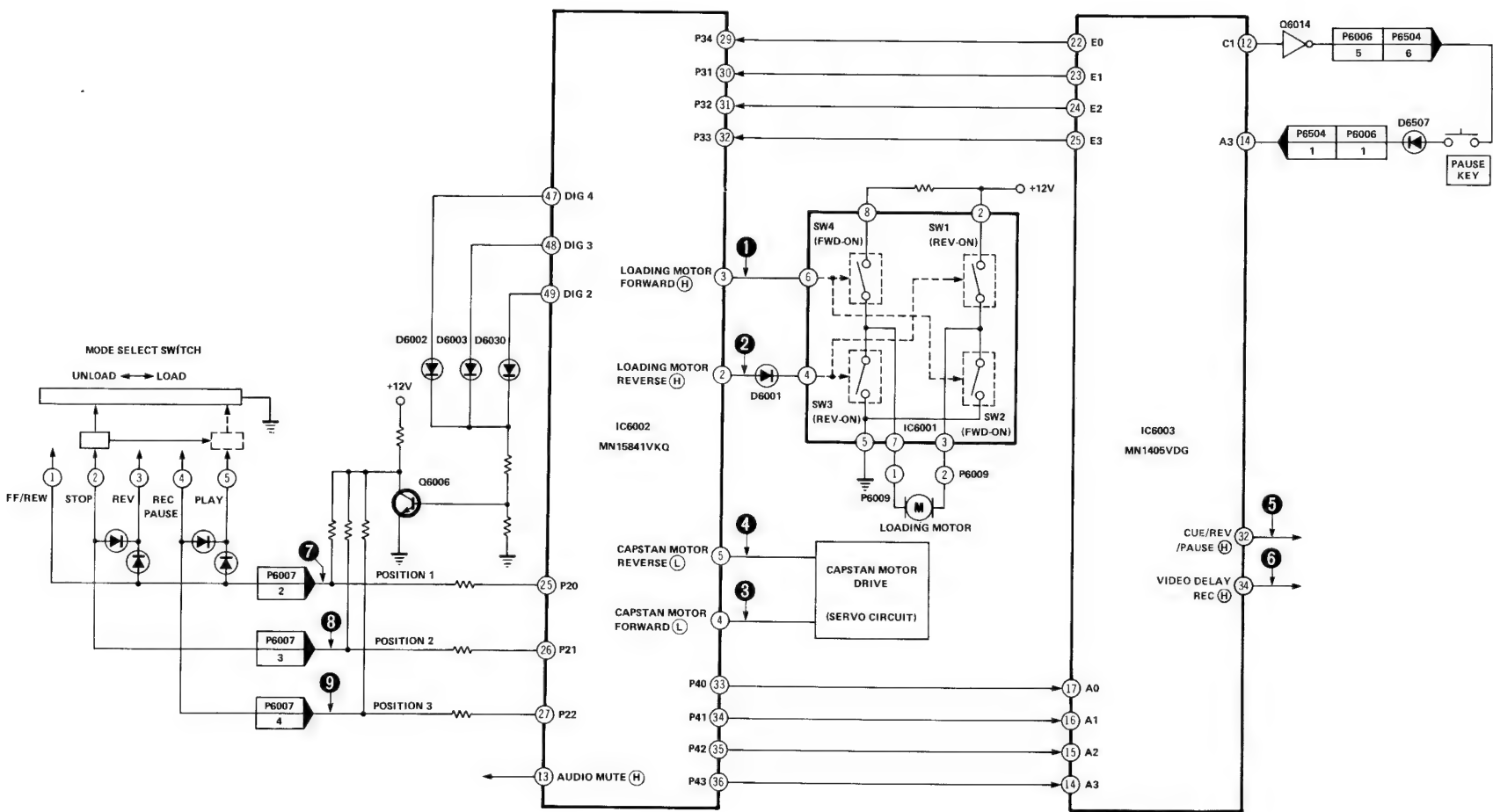


FF → STOP BLOCK DIAGRAM (SYSTEM CONTROL)

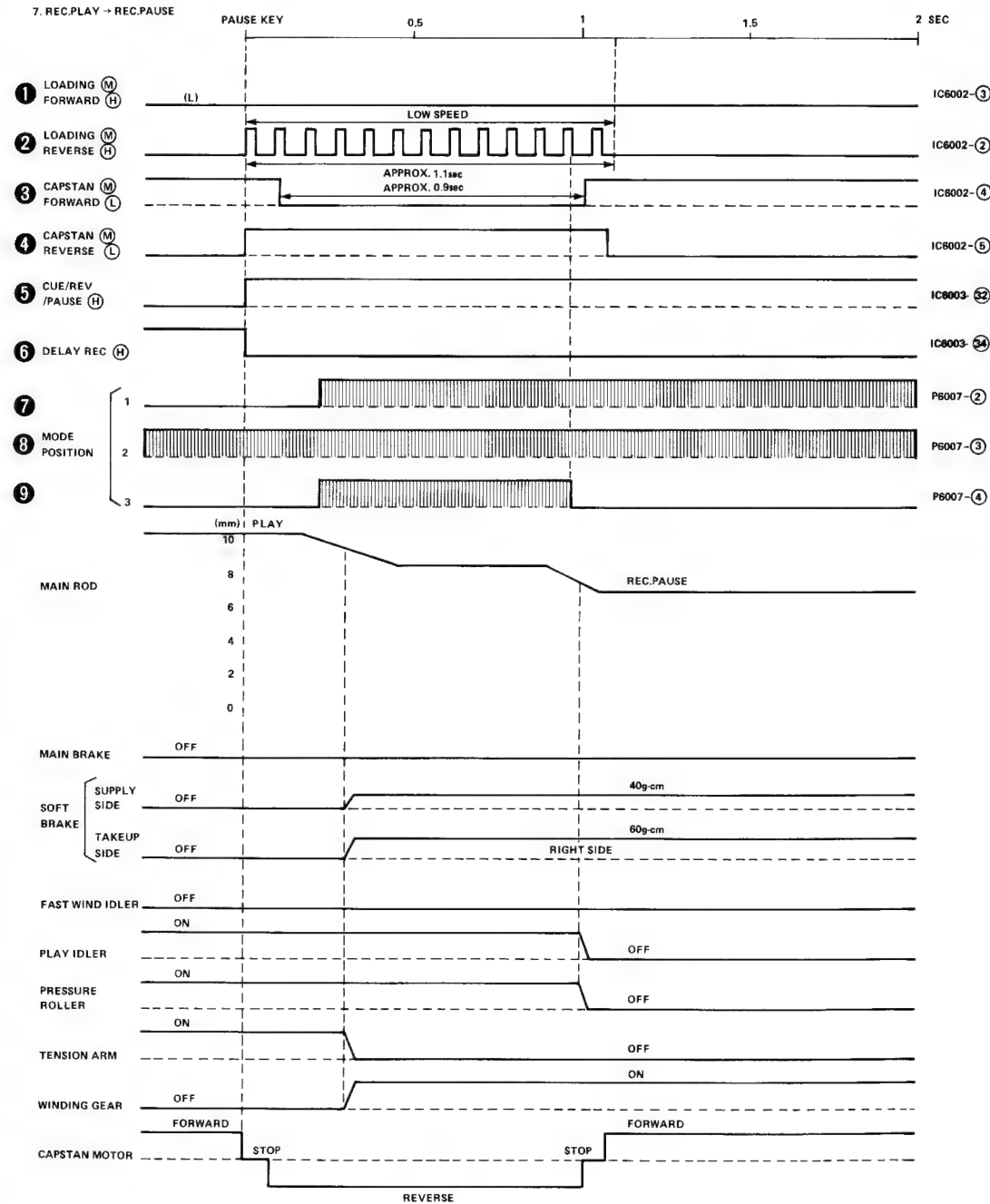
FF → STOP MODE TIMING CHART



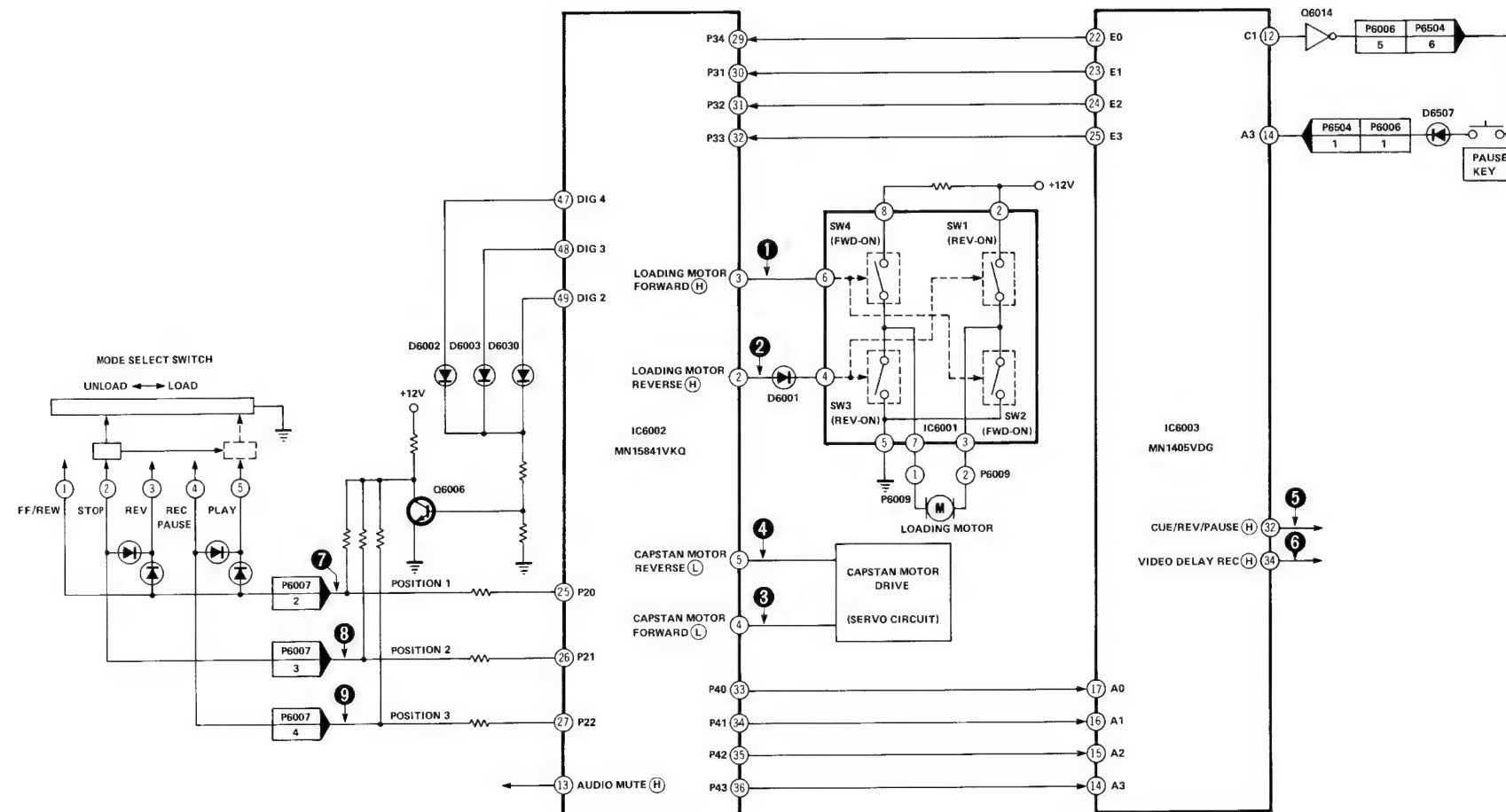
REC • PLAY → REC • PAUSE BLOCK DIAGRAM (SYSTEM CONTROL)



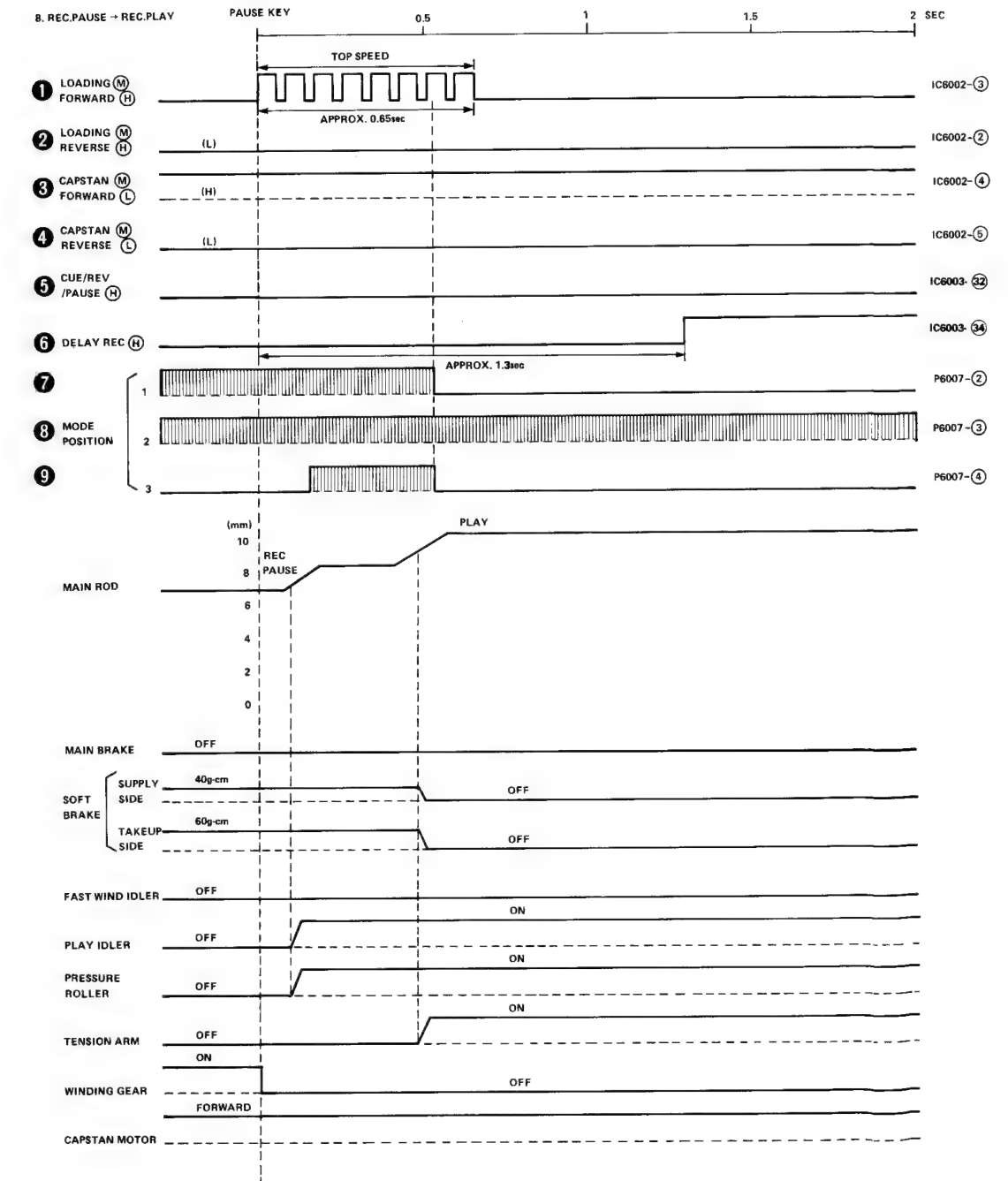
REC • PLAY → REC • PAUSE MODE TIMING CHART



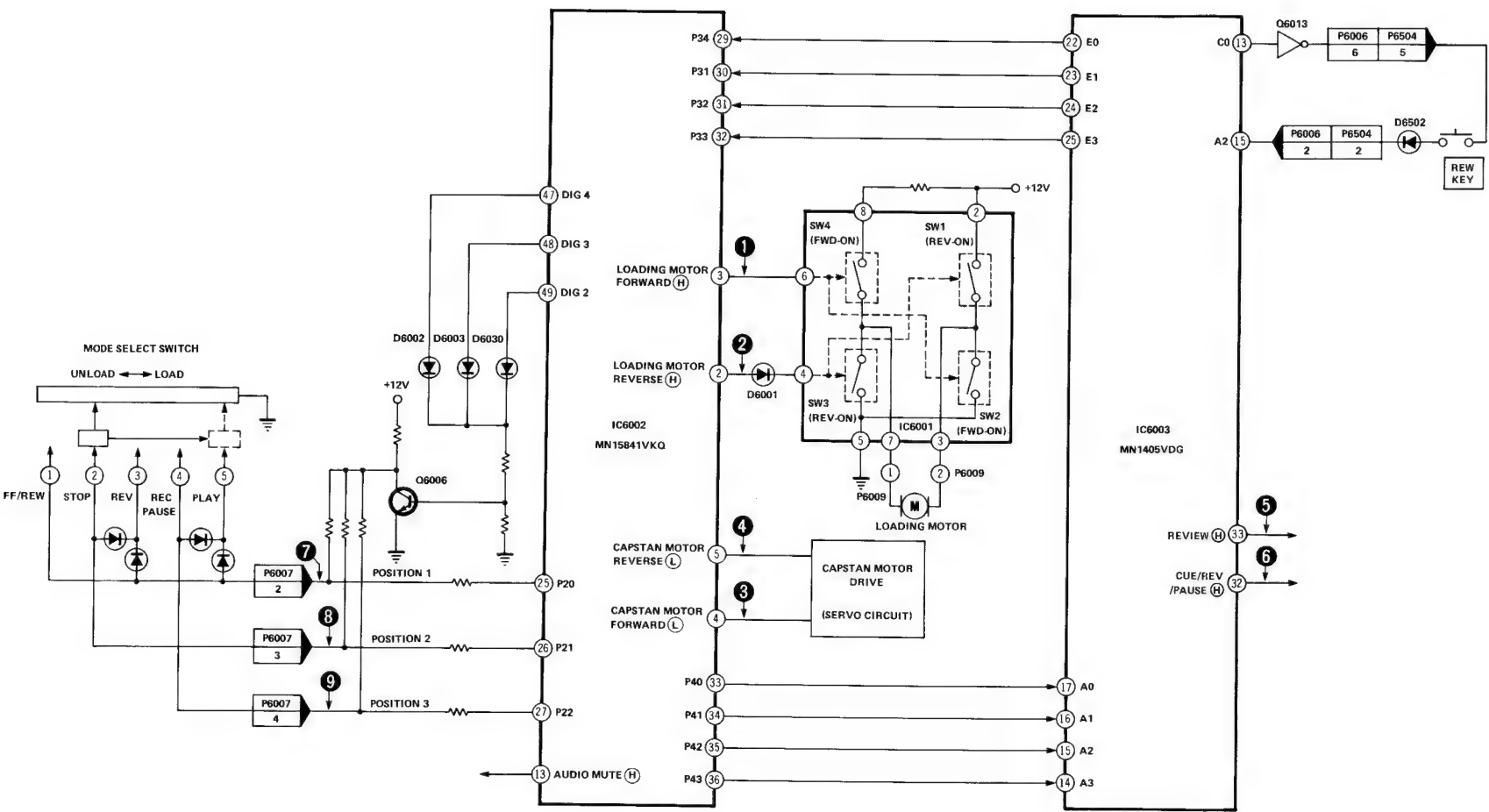
REC • PAUSE → REC • PLAY BLOCK DIAGRAM
(SYSTEM CONTROL)



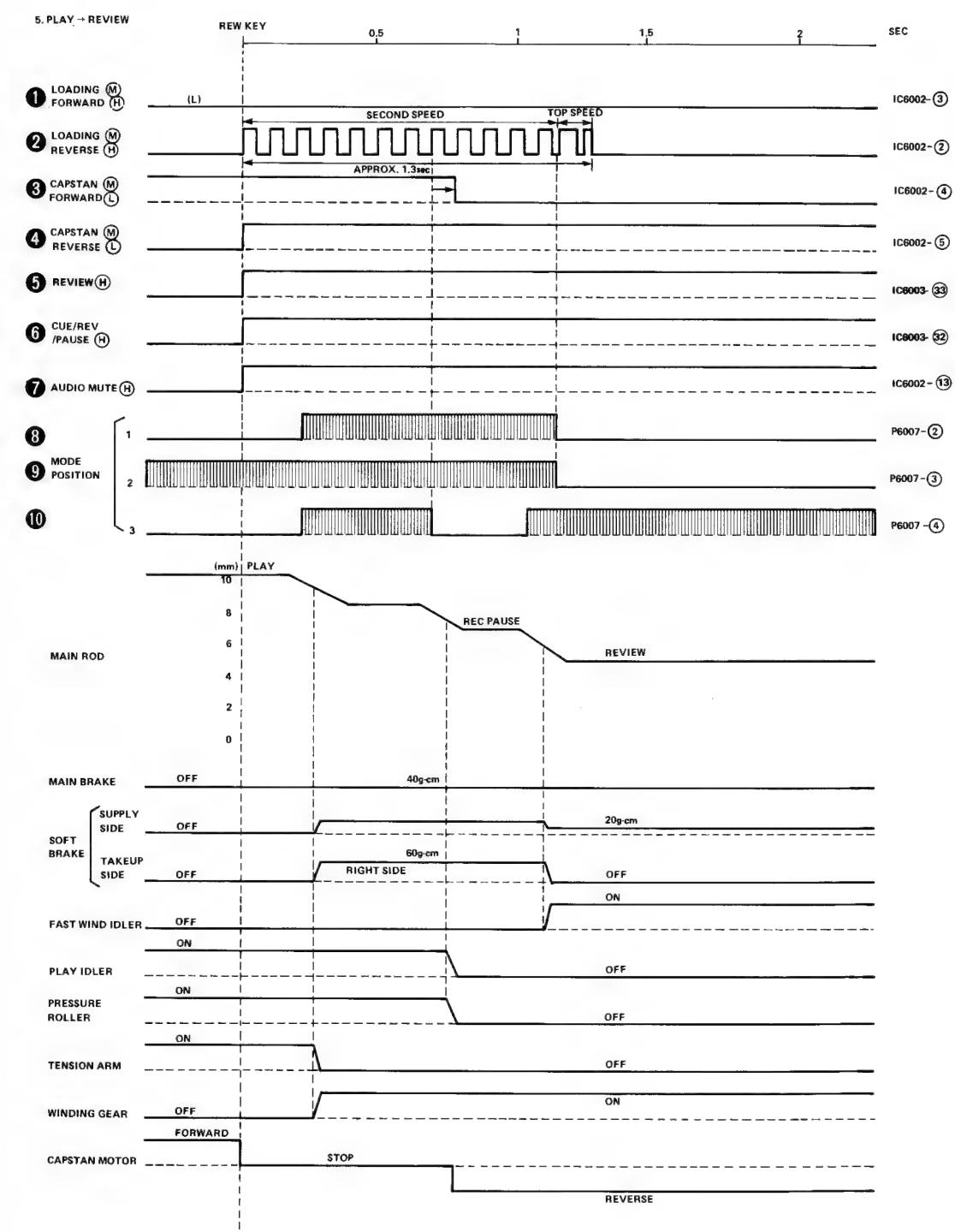
REC . PAUSE → REC • PLAY MODE TIMING CHART



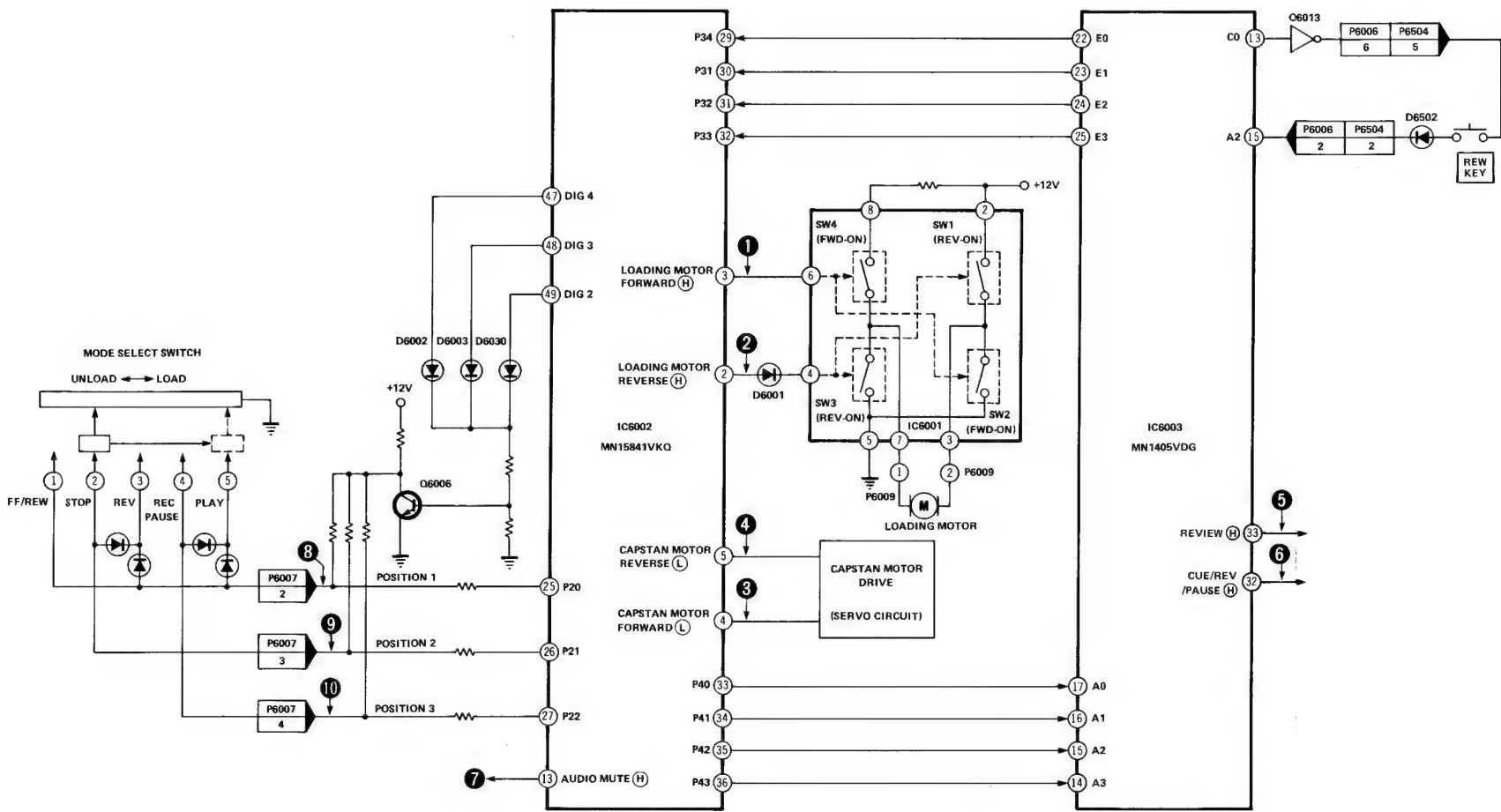
PLAY → REVIEW BLOCK DIAGRAM (SYSTEM CONTROL)



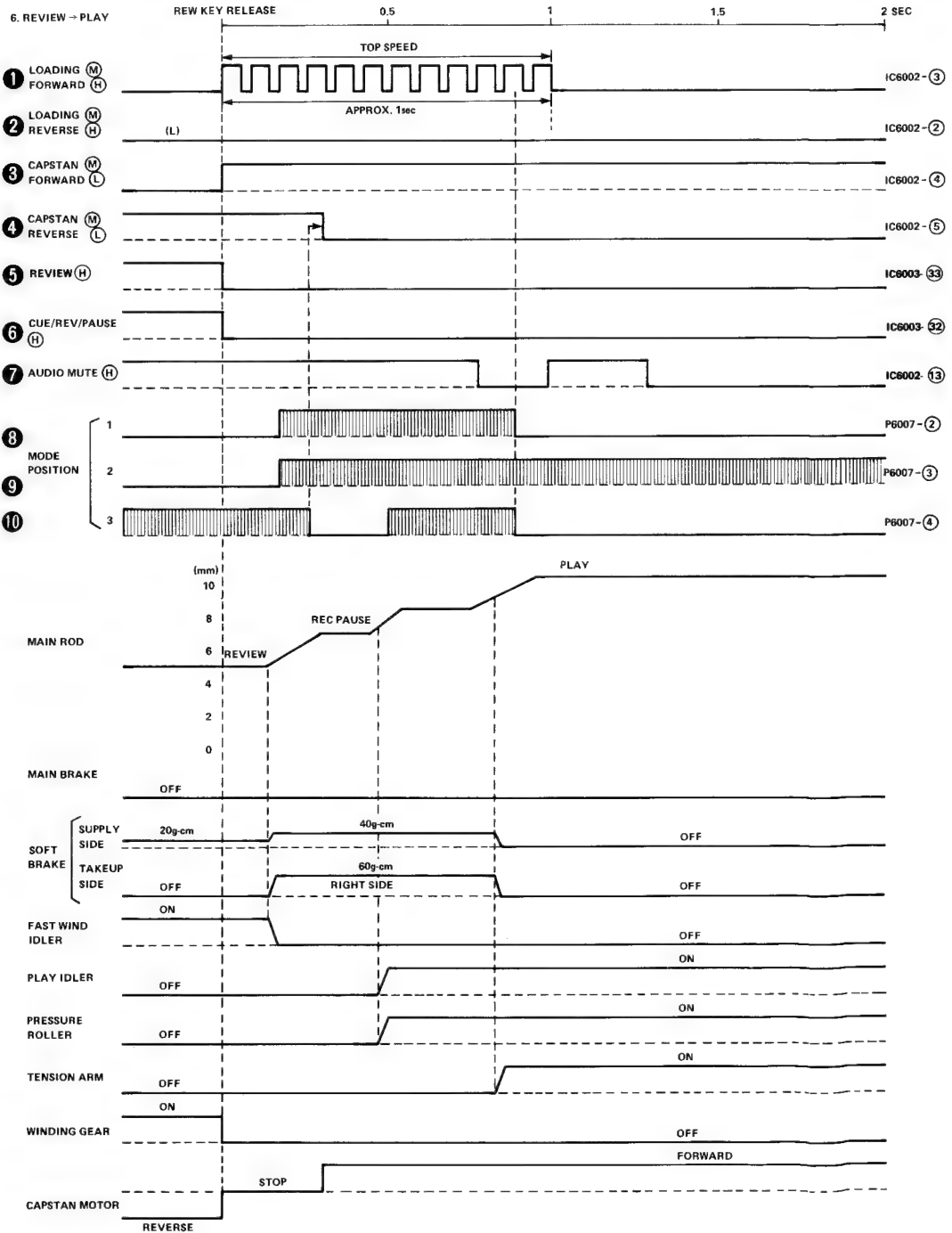
PLAY → REVIEW MODE TIMING CHART



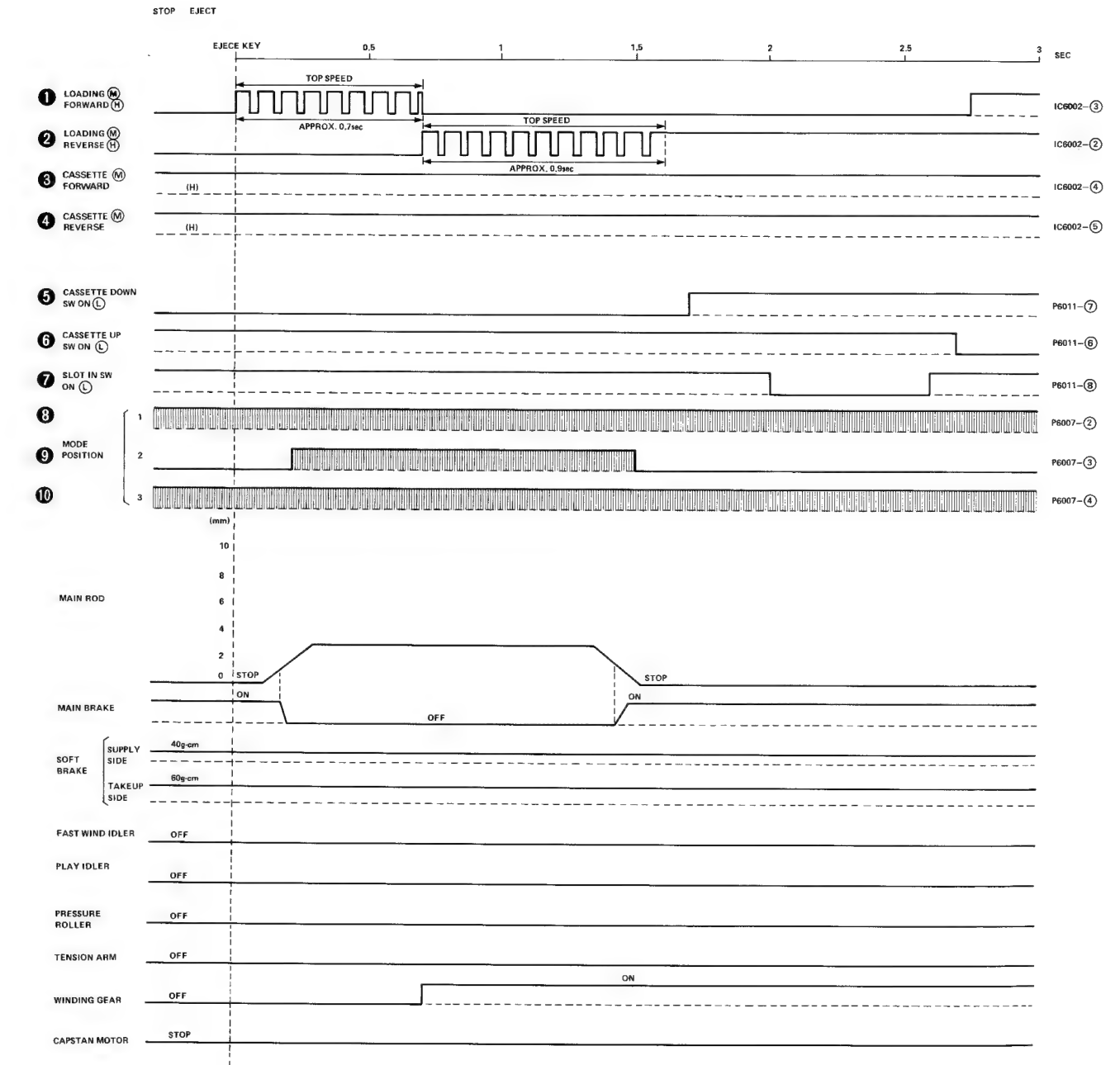
REVIEW → PLAY BLOCK DIAGRAM (SYSTEM CONTROL)



REVIEW → PLAY MODE TIMING CHART



STOP → EJECT MODE TIMING CHART



MICROPROCESSOR (IC6002: MN15841VKQ) I/O CHART (SYSTEM CONTROL)

PIN	I/O	NAME/OPERATION
1	INPUT	VSS
2	OUTPUT	LOADING (M) REVERSE (H)
3	OUTPUT	LOADING (M) FORWARD (H)
4	OUTPUT	CAPSTAN (M) FORWARD (H)
5	OUTPUT	CAPSTAN (M) REVERSE
6	OUTPUT	CH LOCK
7	OUTPUT	CH UP
8	OUTPUT	CH RESET
9	OUTPUT	TV/VCR
10	—	TP6004
11	INPUT	RESET
12	INPUT	IRQ
13	OUTPUT	AUDIO MUTE
14	OUTPUT	POWER ON (L)
15	OUTPUT	SENSOR LED
16	OUTPUT	REC PLAY PAUSE (H)
17	—	×1 (GND)
18	—	×0 (OPEN)
19	INPUT	REF VOLTAGE 1
20	INPUT	P60 (DEW (H), TAKEUP SENSOR (L))
21	INPUT	P61 (UNDER CUT (H), SUPPLY SENSOR (L))
22	INPUT	P62 (CYLINDER LOCK (L), SENSOR LED BROKEN (H))
23	—	—
24	INPUT	REF VOLTAGE 2
25	OUTPUT	P20
26	OUTPUT	P21
27	OUTPUT	P22
28	OUTPUT	P23
29	INPUT	PARALLEL DATA (From MN1405VDG)
30	INPUT	
31	INPUT	
32	INPUT	

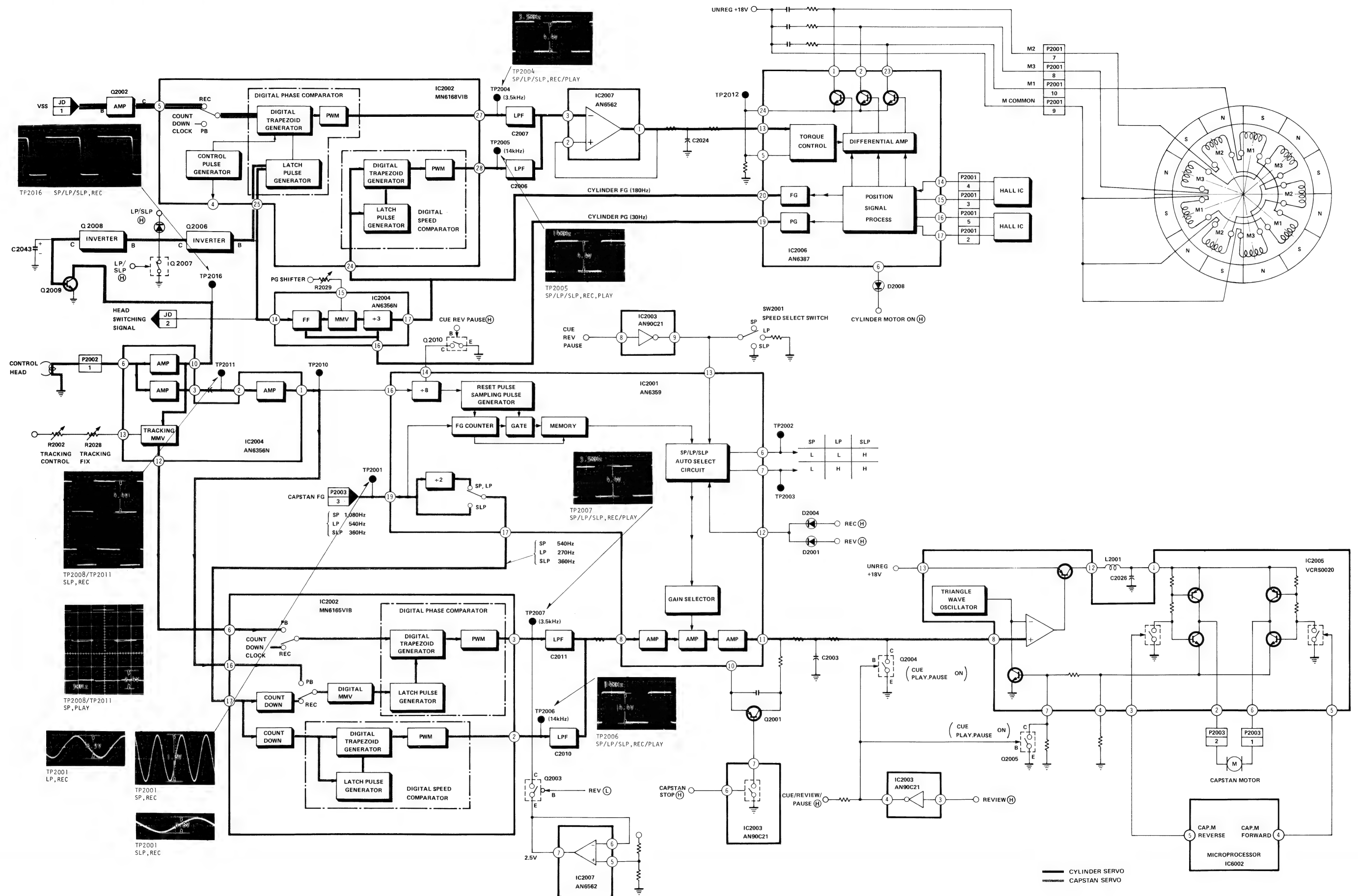
PIN	I/O	NAME/OPERATION
33	OUTPUT	P40
34	OUTPUT	P41
35	OUTPUT	P42
36	OUTPUT	P43
37	OUTPUT	DIG E
38	OUTPUT	DIG D
39	OUTPUT	DIG C
40	OUTPUT	DIG B
41	OUTPUT	DIG A
42	OUTPUT	DIG 9
43	OUTPUT	DIG 8
44	OUTPUT	DIG 7
45	OUTPUT	DIG 6
46	OUTPUT	DIG 5
47	OUTPUT	DIG 4
48	OUTPUT	DIG 3
49	OUTPUT	DIG 2
50	OUTPUT	DIG 1
51	OUTPUT	DIG 0
52	OUTPUT	SEGMENT 8
53	OUTPUT	SEGMENT 7
54	OUTPUT	SEGMENT 6
55	OUTPUT	SEGMENT 5
56	OUTPUT	SEGMENT 4
57	OUTPUT	SEGMENT 3
58	OUTPUT	SEGMENT 2
59	OUTPUT	SEGMENT 1
60	OUTPUT	SEGMENT 0
61	INPUT	Vpp
62	INPUT	OSC 2
63	INPUT	OSC 1
64	INPUT	VDD

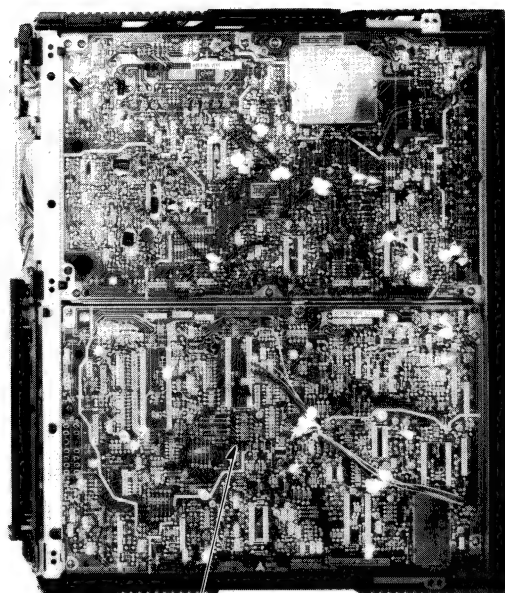
MICROPROCESSOR (IC6003: MN1405VDG) I/O CHART (SYSTEM CONTROL)

PIN	I/O	NAME/OPERATION
1	INPUT	Vss
2	OUTPUT	CUE RESET (H)
3	OUTPUT	CYLINDER ON (H)
4	OUTPUT	FF/REW (H)
5	OUTPUT	CASSETTE (M) FORWARD (H)
6	OUTPUT	CASSETTE (M) REVERSE (H)
7	OUTPUT	LP/SLP (H)
8	OUTPUT	HEAD CONTROL C
9	OUTPUT	HEAD CONTROL B
10	OUTPUT	HEAD CONTROL A
11	OUTPUT	C2
12	OUTPUT	C1
13	OUTPUT	C0
14	INPUT	DATA IN A3 PARALLEL DATA (from MN15841VKQ)
		SCAN PULSE OPERATION
		C2 —
		C1 PLAY KEY
15	INPUT	DATA IN A2 PARALLEL DATA (from MN15841VKQ)
		SCAN PULSE OPERATION
		C2 LP/SLP (H)
		C1 REC KEY
16	INPUT	DATA IN A1 PARALLEL DATA (from MN15841VKQ)
		SCAN PULSE OPERATION
		C2 AUDIO MUTE
		C1 F ADVANCE KEY
		C0 REW KEY

PIN	I/O	NAME/OPERATION
17	INPUT	DATA IN A0 PARALLEL DATA (from MN15841VKQ)
		SCAN PULSE OPERATION
		C2 CAMERA REMOTE PAUSE
		C1 PAUSE/STILL KEY
		C0 FF KEY
18	INPUT	CASSETTE UP
19	INPUT	CASSETTE DOWN
20	INPUT	SLOT IN
21	INPUT	SENSOR LED
22	OUTPUT	E0
23	OUTPUT	E1
24	OUTPUT	E2
25	OUTPUT	E3
PARALLEL DATA (to MN15841VKQ)		
26	—	GND
27	INPUT	RESET
28	—	+5V
29	INPUT	SERIAL DATA (IO MODE IR REMOTE CONTROL)
30	INPUT	REFERENCE FREQUENCY
31	OUTPUT	REC (H)
32	OUTPUT	CUE/REVIEW/PAUSE (H)
33	OUTPUT	REVIEW (H)
34	OUTPUT	VIDEO DELAY REC (H)
35	OUTPUT	VIDEO EE/VV EE (H)
36	OUTPUT	AUDIO EE/VV EE (H)
37	OUTPUT	AUDIO REC (H)
38	OUTPUT	F. ADVANCE PULSE
39	INPUT	VDD
40	INPUT	OSC

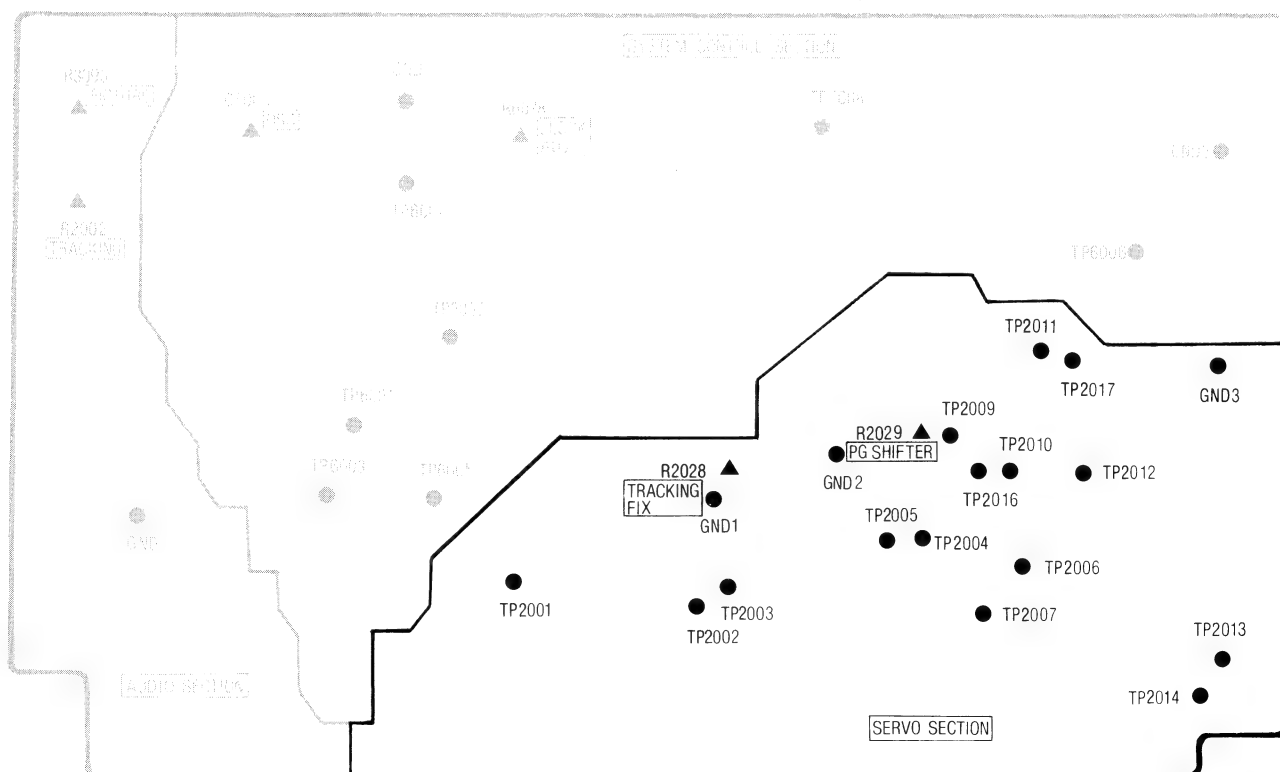
SERVO BLOCK DIAGRAM



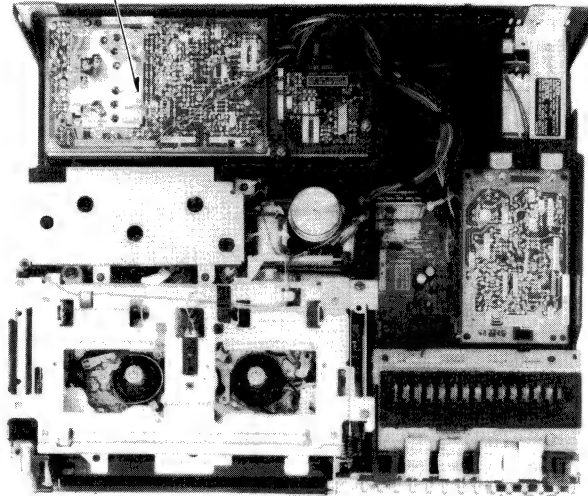


Servo Section (Servo/Audio/
System Control C.B.A.)

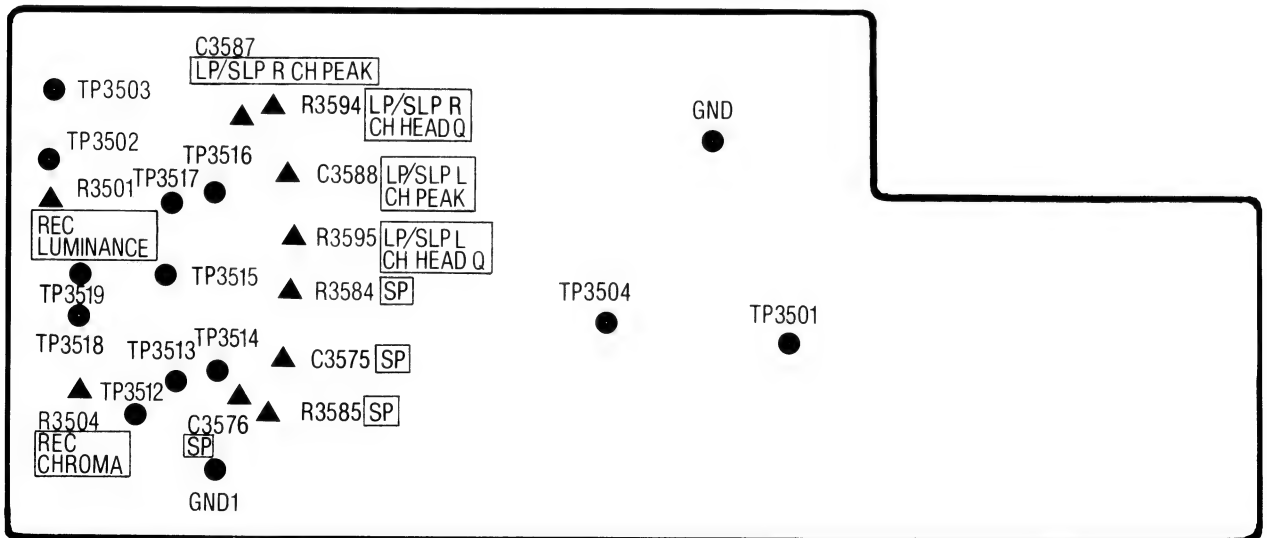
LOCATION OF TEST POINTS & ADJUSTMENT POINTS



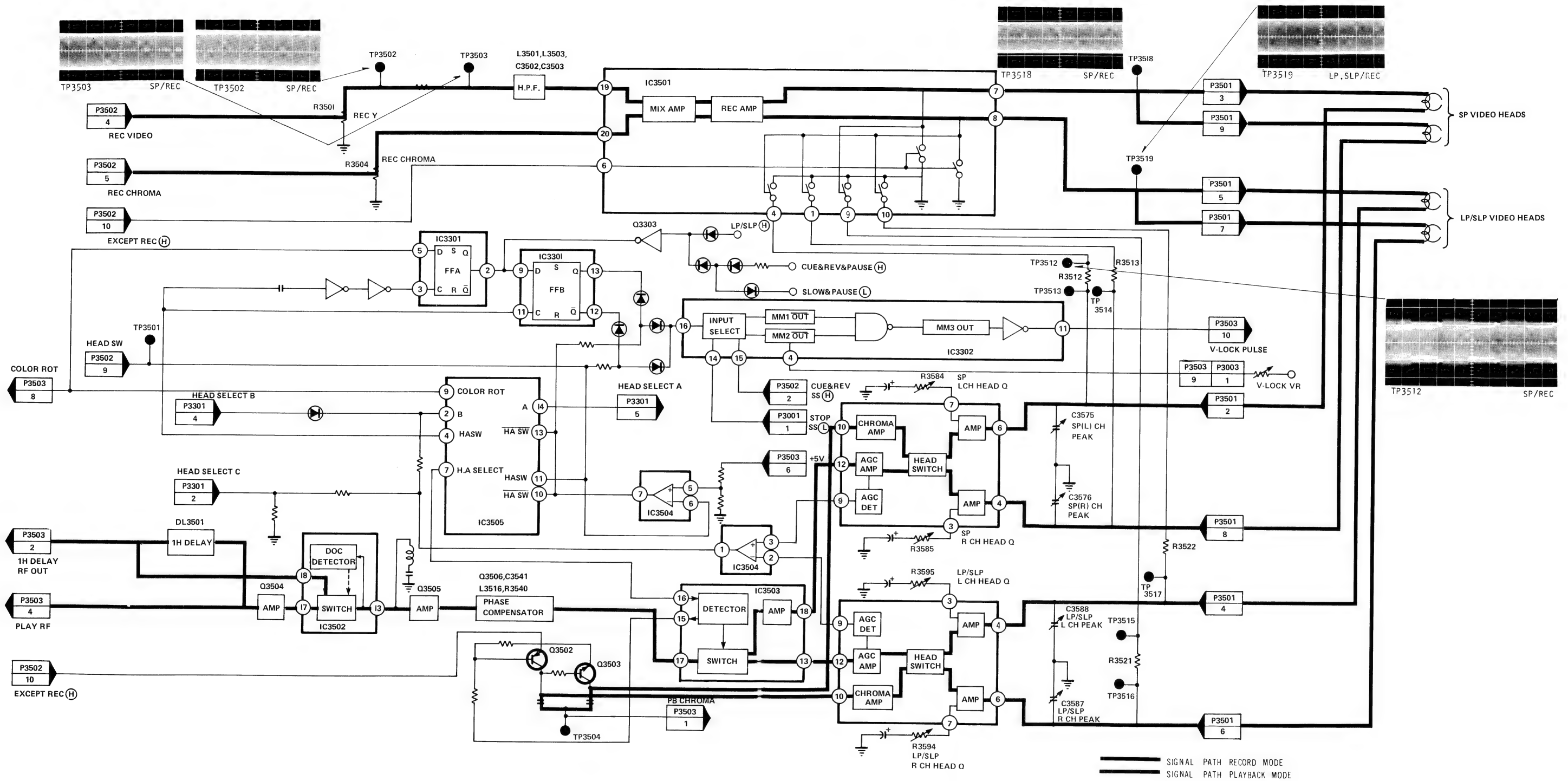
Head Amp C.B.A.



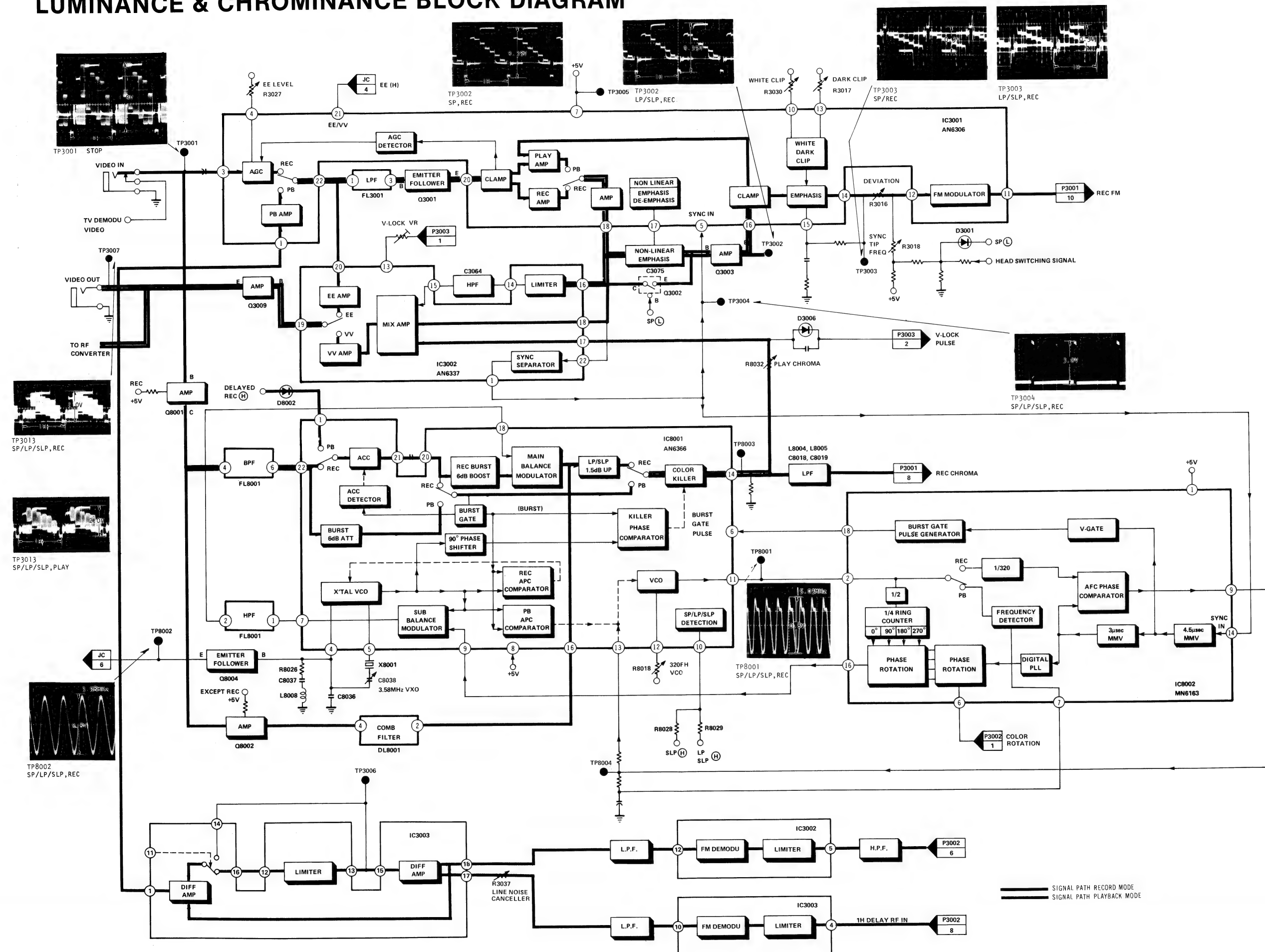
LOCATION OF TEST POINTS & ADJUSTMENT POINTS



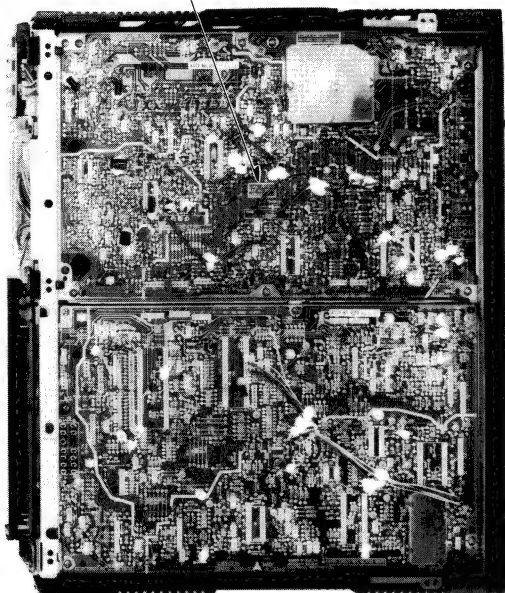
HEAD AMP BLOCK DIAGRAM



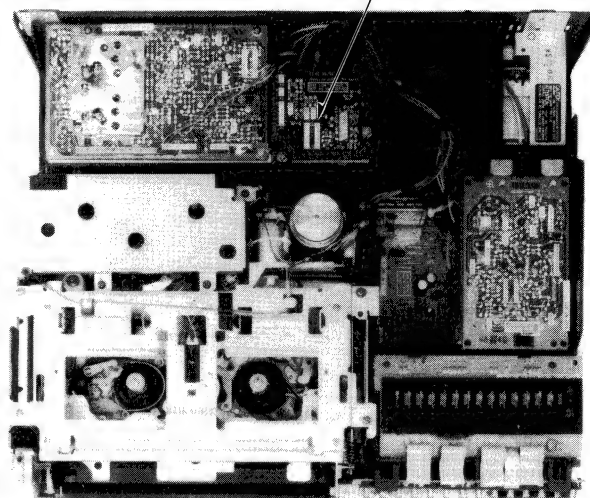
LUMINANCE & CHROMINANCE BLOCK DIAGRAM



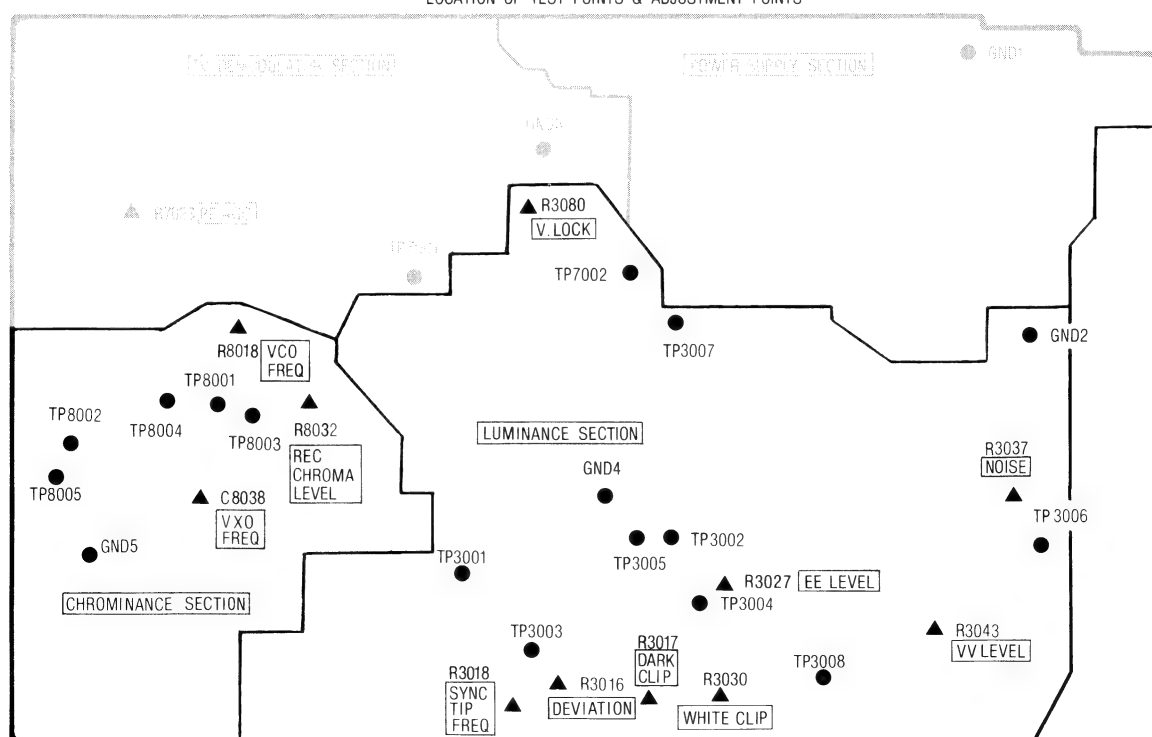
Luminance & Chrominance Section
(Luminance/Chrominance/Power
Supply/TV Demodulator C.B.A.)

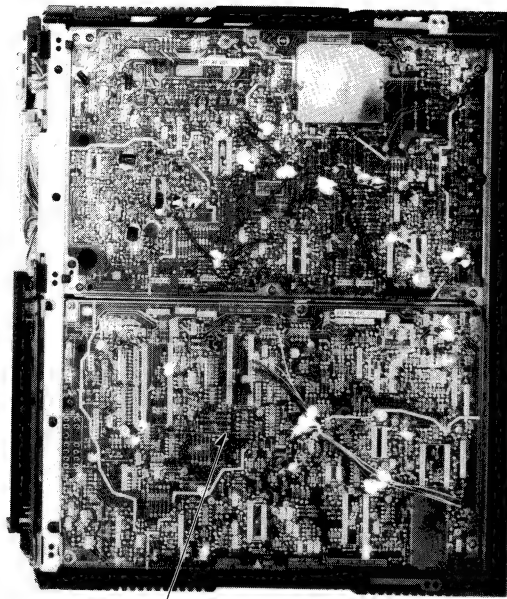


Sub-Luminance C.B.A.

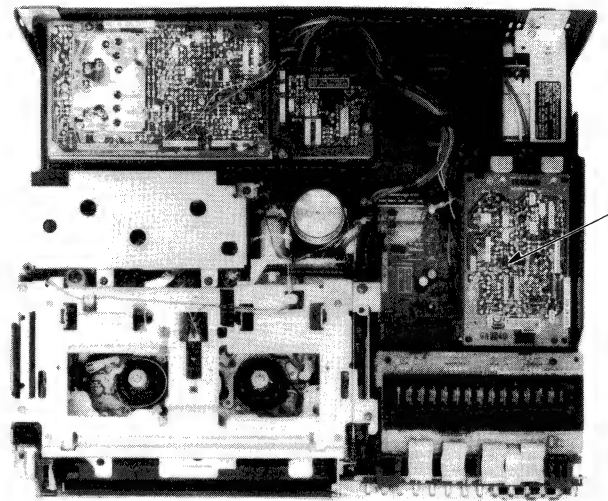


LOCATION OF TEST POINTS & ADJUSTMENT POINTS



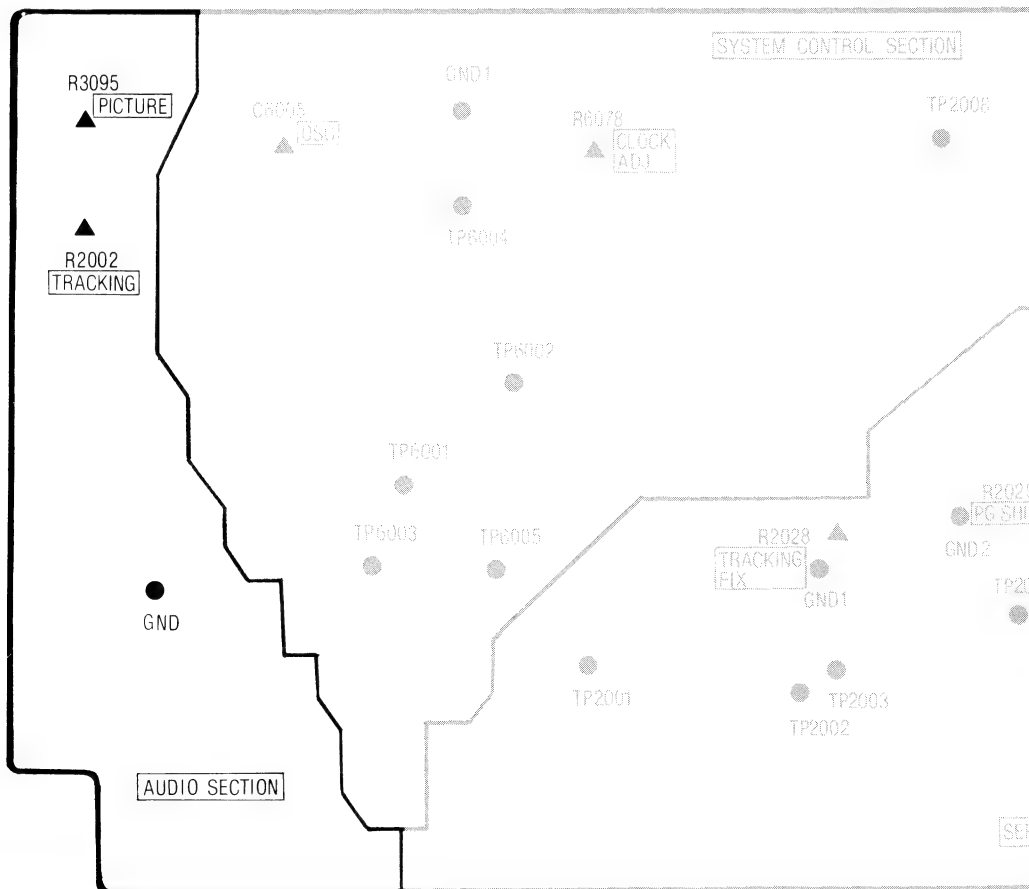


Servo/Audio/System
Control C.B.A.)

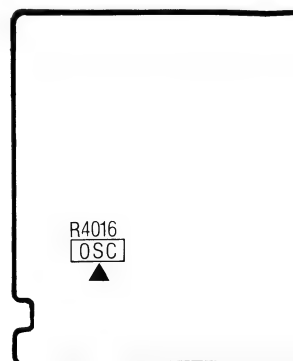


Audio

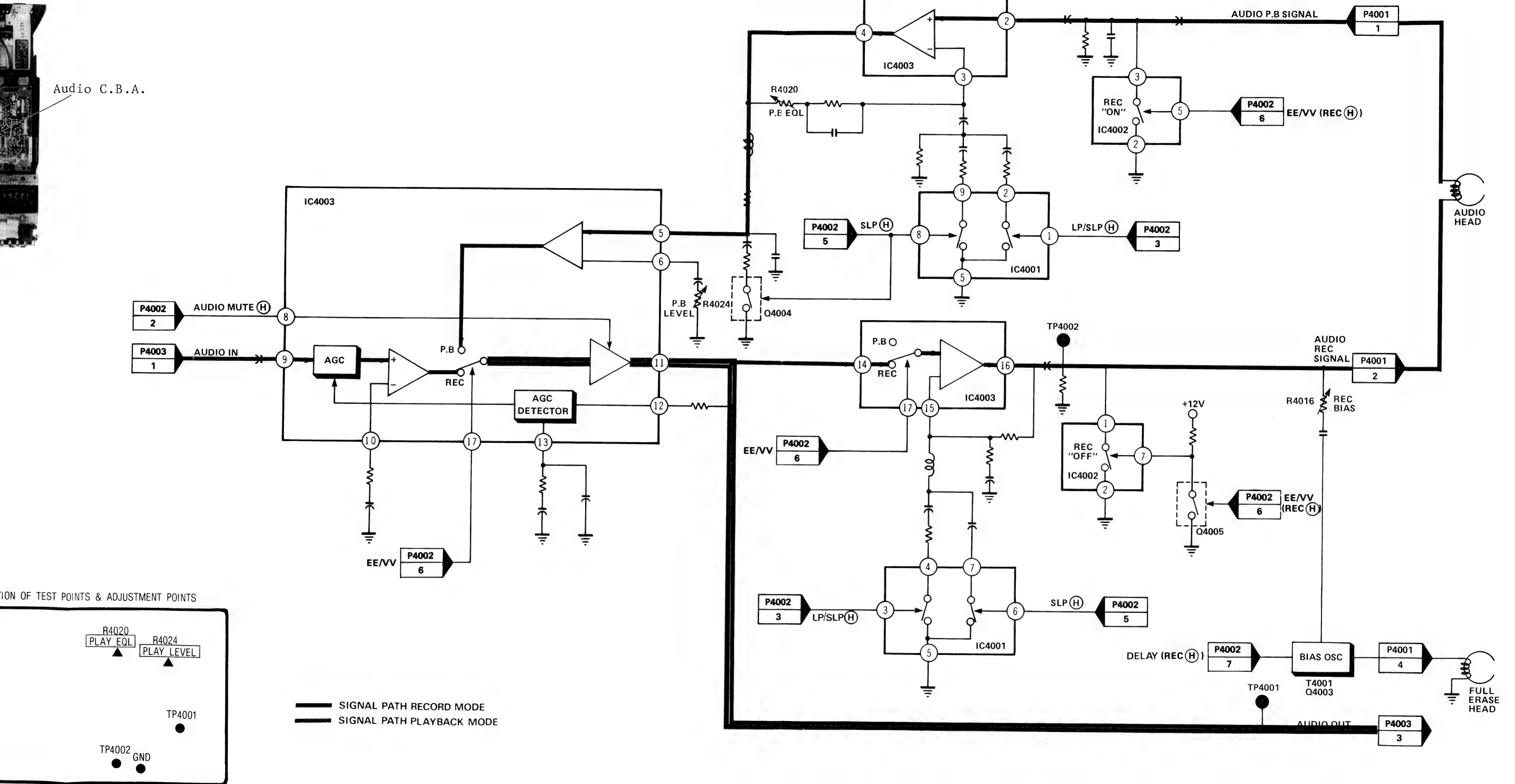
LOCATION OF TEST POINTS & ADJUSTMENT POINTS



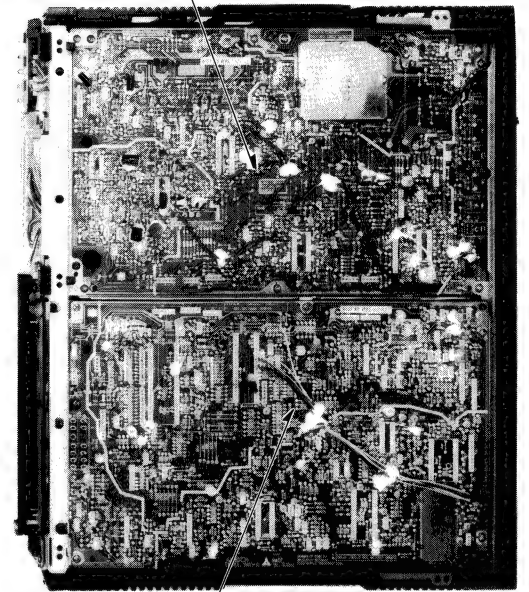
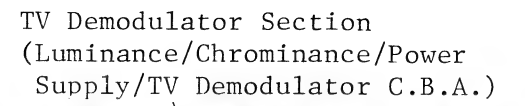
LOCATION OF TEST POINTS



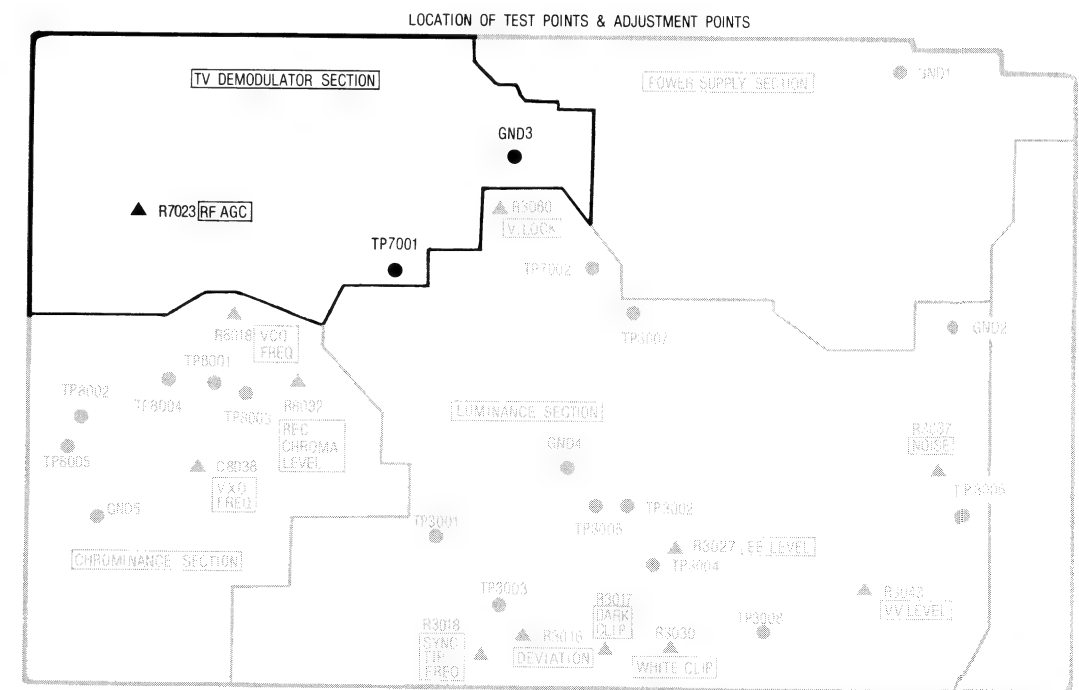
AUDIO BLOCK DIAGRAM



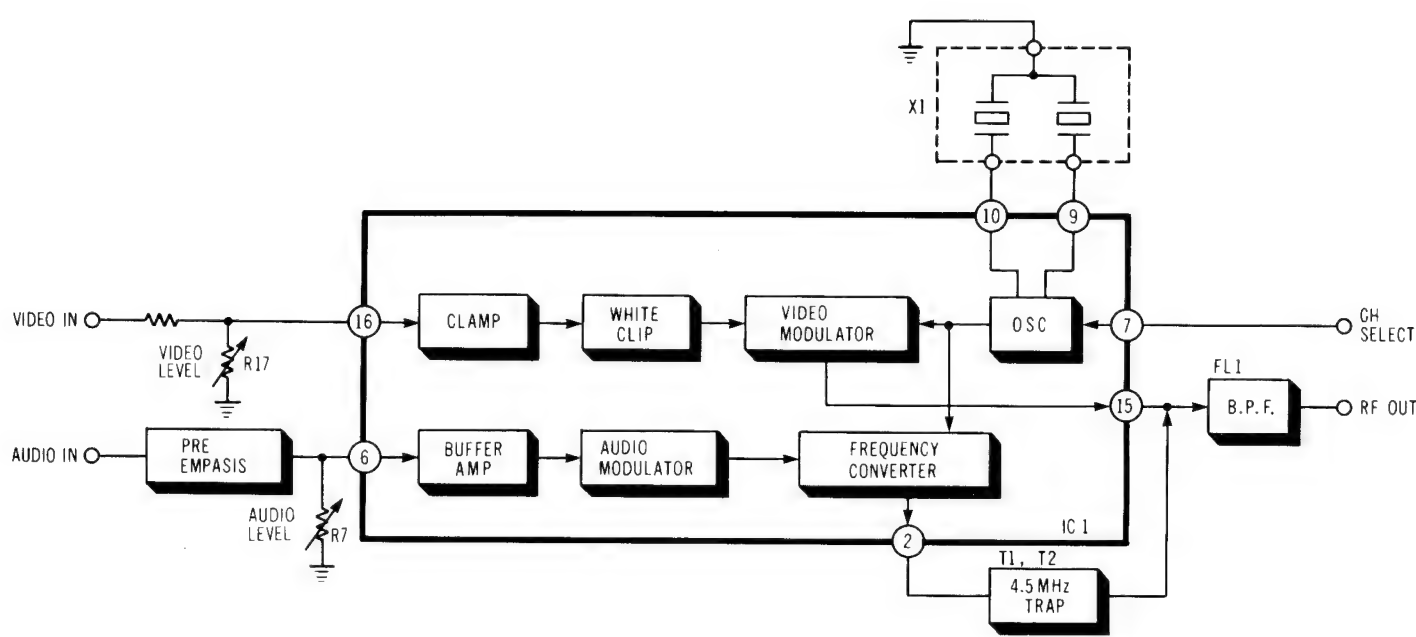
3—21



Servo/ Audio/ System
Control C.B.A.



RF CONVERTER BLOCK DIAGRAM



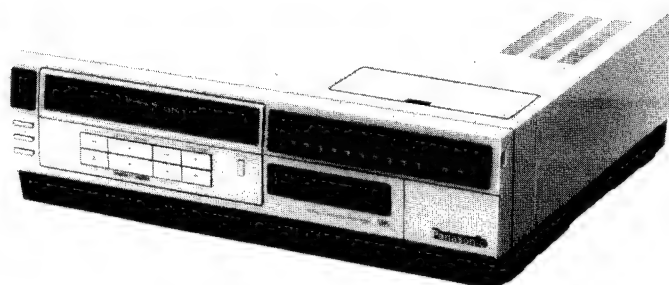
Panasonic[®]
MATSUSHITA ELECTRIC

Service Manual

Video Cassette Recorder

Vol. 4
Panasonic
Omnivision VHS
PV-1520

Schematic Diagrams Circuit Board Diagrams



SPECIFICATIONS

Power Source: 120V AC $\pm 10\%$, 60Hz $\pm 0.5\%$
 Power Consumption: Approx. 24 watts (When the Power switch is OFF, Approx. 11 watts)
 Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
 Luminance: FM azimuth recording
 Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track
 Tape Format: Tape width 1/2" (12.7mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35mm/s)
 LP mode: 21/32 i.p.s. (16.67mm/s)
 SLP mode: 7/16 i.p.s. (11.12mm/s)

Record/Playback Time: 8 HRS. with 160min. type tape used in SLP mode

FF/REW Time: Less than 6min. with 120min. type tape

Heads: Video: 4 rotary heads
 Audio/Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)
 1.0Vp-p, 75 Ω unbalanced
 Audio: AUDIO IN Jack (RCA type)
 -20dB, 50k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch13,
 Cable Channels "A"-"W"
 75 Ω unbalanced
 UHF Input: Ch14-Ch83,
 300 Ω balanced

Output Level: Video: VIDEO OUT Jack (RCA type)
 1.0Vp-p, 75 Ω unbalanced
 Audio: AUDIO OUT Jack (RCA type)
 -6dB, 600 Ω unbalanced

RF Modulated: Ch3/Ch4 switchable,
 72dB μ , (Open Voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 230 lines

Audio Frequency

Response: SP mode: 100Hz ~ 8kHz
 (10dB down) LP mode: 100Hz ~ 6kHz
 SLP mode: 100Hz ~ 5kHz

Signal-to-Noise Ratio: Video: SP mode: better than 41dB
 LP mode: better than 41dB
 SLP mode: better than 41dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42dB
 LP mode: better than 40dB
 SLP mode: better than 40dB

Operating

Temperature: 41°F—104°F (5°C—40°C)
 Operating Humidity: 10%—75%
 Weight: 20.1 lbs. (9.1kg)
 Dimensions: 16-15/16"(W) \times 14-5/16"(D) \times 5-1/8"(H)
 (430mm \times 364mm \times 130mm)

Accessories Supplied:

- Wireless remote control unit
- VHF matching box 75 Ω —300 Ω transformer
- 300 Ω —75 Ω transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable
- Video cassette tape, NV-T60

Available Tapes:

1/2" VHS video cassette tapes
 NV-T160 Approx. 1073ft. (327mm), 160, 320, or 480min.
 NV-T120 Approx. 810ft. (247mm), 120, 240, or 360min.
 NV-T60 Approx. 417ft. (127m), 60, 120, or 180min.

Weight and dimensions shown are approximate. Designs and specifications are subject to change without notice.

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CONTENTS

OPERATION CIRCUIT	4- 1
SERVO & SYSTEM CONTROL SCHEMATIC DIAGRAM	4- 2
SYSTEM CONTROL CIRCUIT IC6002 IC6003 MATRIX CHART	4- 3
SERVO & SYSTEM CONTROL CIRCUIT VOLTAGE CHART	4- 4
SERVO & SYSTEM CONTROL C.B.A.	4- 5
LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL SCHEMATIC DIAGRAM.....	4- 6
LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL C.B.A.	4- 7
AUDIO CIRCUIT	4- 8
HEAD AMP C.B.A.	4- 8
HEAD AMP SCHEMATIC DIAGRAM	4- 9
CHANNEL SELECTOR SCHEMATIC DIAGRAM	4-10
CHANNEL SWITCHES & TIMER OPERATING C.B.A.	4-11
CHANNEL SELECTOR & POTENTIOMETERS C.B.A.	4-11
TV DEMODULATOR CIRCUIT	4-12
UHF/VHF TUNER CIRCUIT	4-13
RF CONVERTER CIRCUIT (VEQS0206)	4-14
RF CONVERTER CIRCUIT (VEQS0236)	4-15
ANTENNA TERMINAL CIRCUIT	4-15
IR WIRELESS TRANSMITTER CIRCUIT	4-16
SENSOR LED C.B.A.	4-16
SUPPLY PHOTO TR C.B.A.	4-16
TAKEUP PHOTO TR C.B.A.	4-16
AUDIO/CONTROL HEAD C.B.A.....	4-16
REEL SENSOR C.B.A.	4-16
MODE SELECT SWITCH C.B.A.	4-16
FUSE C.B.A.	4-16
CONNECTION C.B.A.	4-16
REMOTE RECIEVING DETECTOR UNIT	4-16
INTERCONNECTION SCHEMATIC DIAGRAM	4-17

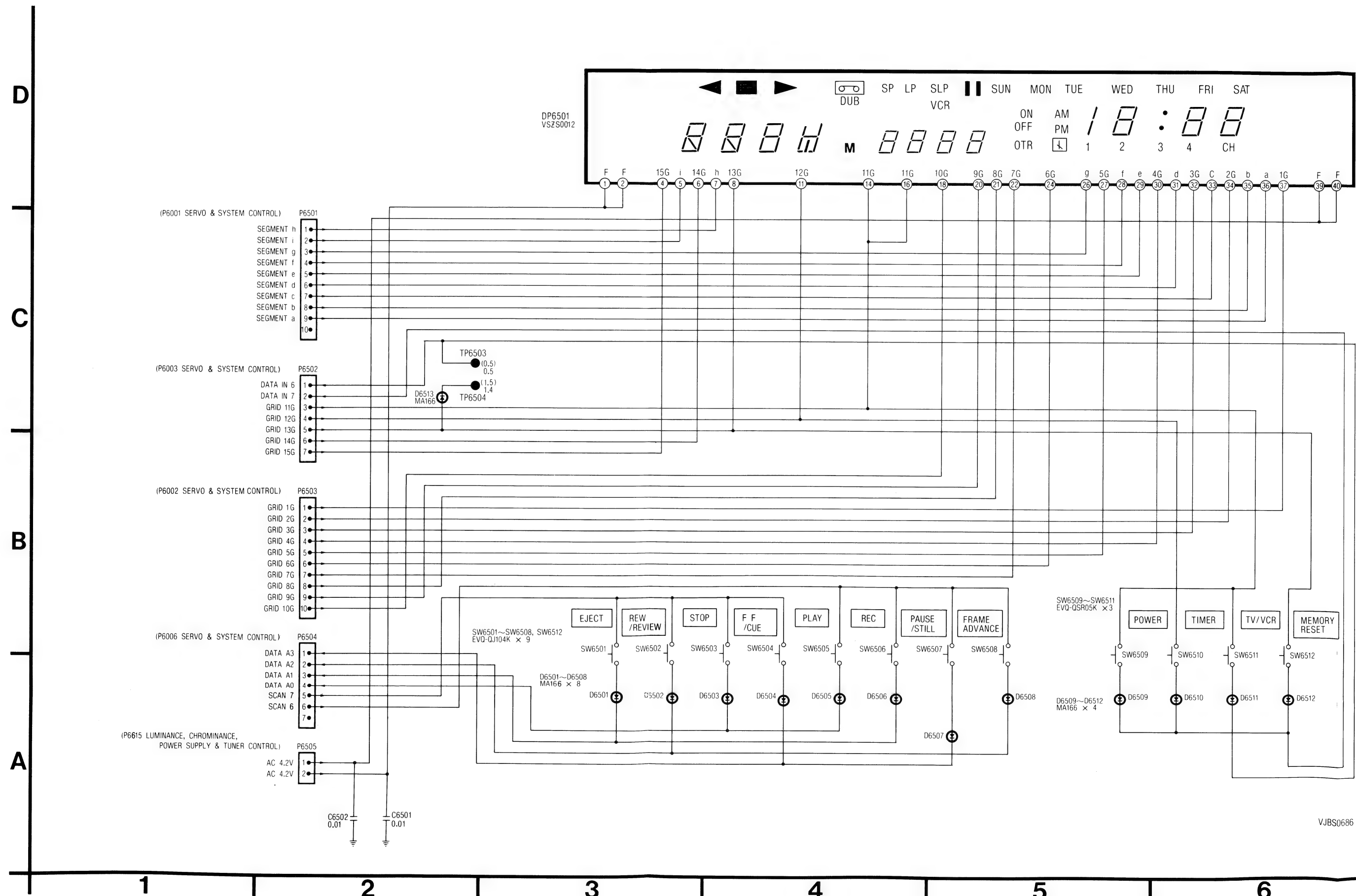
IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

OPERATION SCHEMATIC DIAGRAM

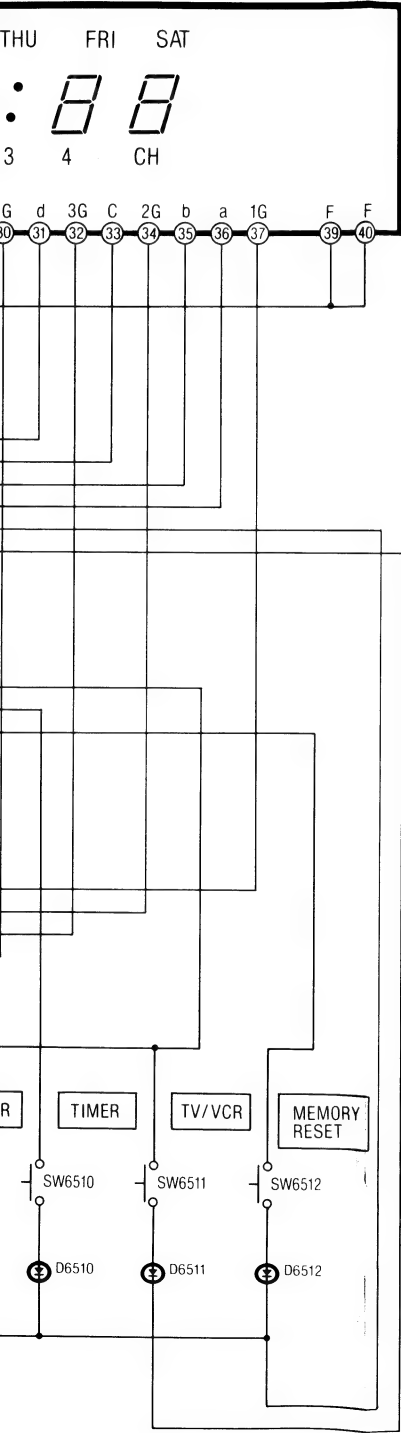
VOLTAGE MEASUREMENT:
COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.
COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

CALLOUTS NEXT TO WIRING P
CONNECTIONS TO OTHER SCHE



NOTE: REF. NO. ON C.
EXAMPLE: C.B.A.
S
(R650)

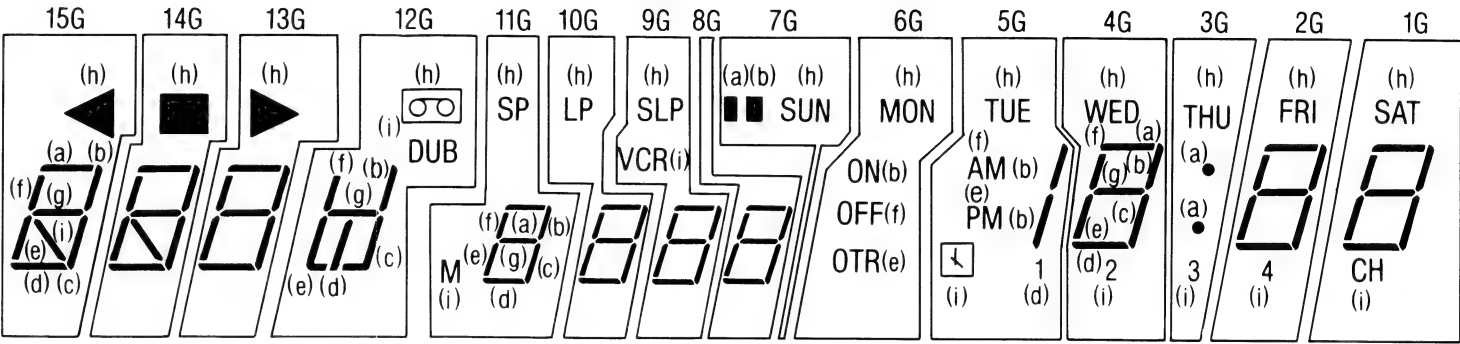
CALLOUTS NEXT TO WIRING PLUGS INDICATE
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.



VJBS0686

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A.---R2, REF. NO. 6500 SERIES
SCHEMATIC DIAGRAM---R6502
(R6502 IS ABBREVIATED TO R2)

DISPLAY (DP6501) CONNECTION CHART



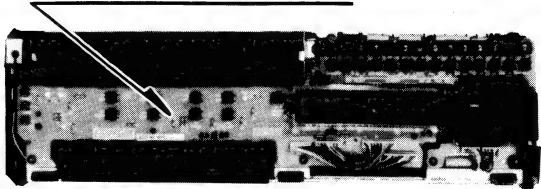
PIN NO.	SIGNAL NAME
1	FILAMENT
2	FILAMENT
3	—
4	GRID 15G
5	SEGMENT i
6	GRID 14G
7	SEGMENT h
8	GRID 13G
9	—
10	—

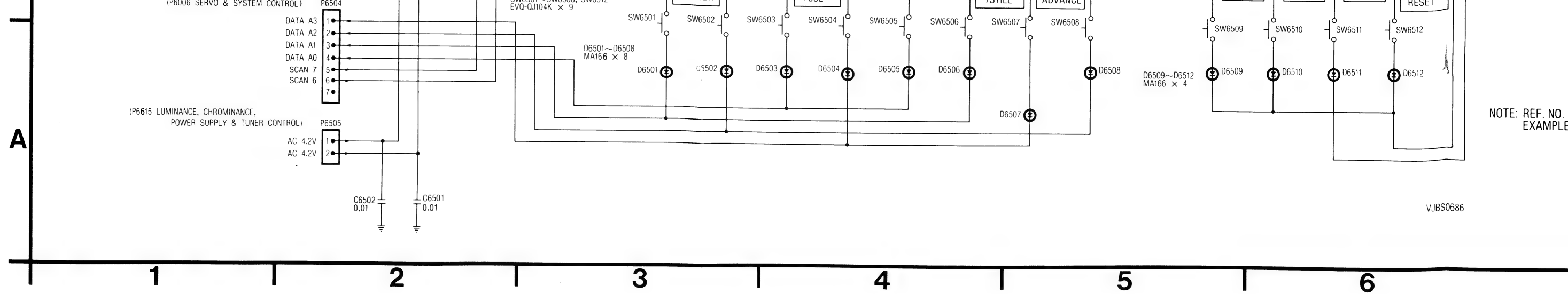
PIN NO.	SIGNAL NAME
11	GRID 12G
12	—
13	—
14	GRID 11G
15	—
16	GRID 11G
17	—
18	GRID 10G
19	—
20	GRID 9G

PIN NO.	SIGNAL NAME
21	GRID 8G
22	GRID 7G
23	—
24	GRID 6G
25	—
26	SEGMENT g
27	GRID 5G
28	SEGMENT f
29	SEGMENT e
30	GRID 4G

PIN NO.	SIGNAL NAME
31	SEGMENT d
32	GRID 3G
33	SEGMENT c
34	GRID 2G
35	SEGMENT b
36	SEGMENT a
37	GRID 1G
38	—
39	FILAMENT
40	FILAMENT

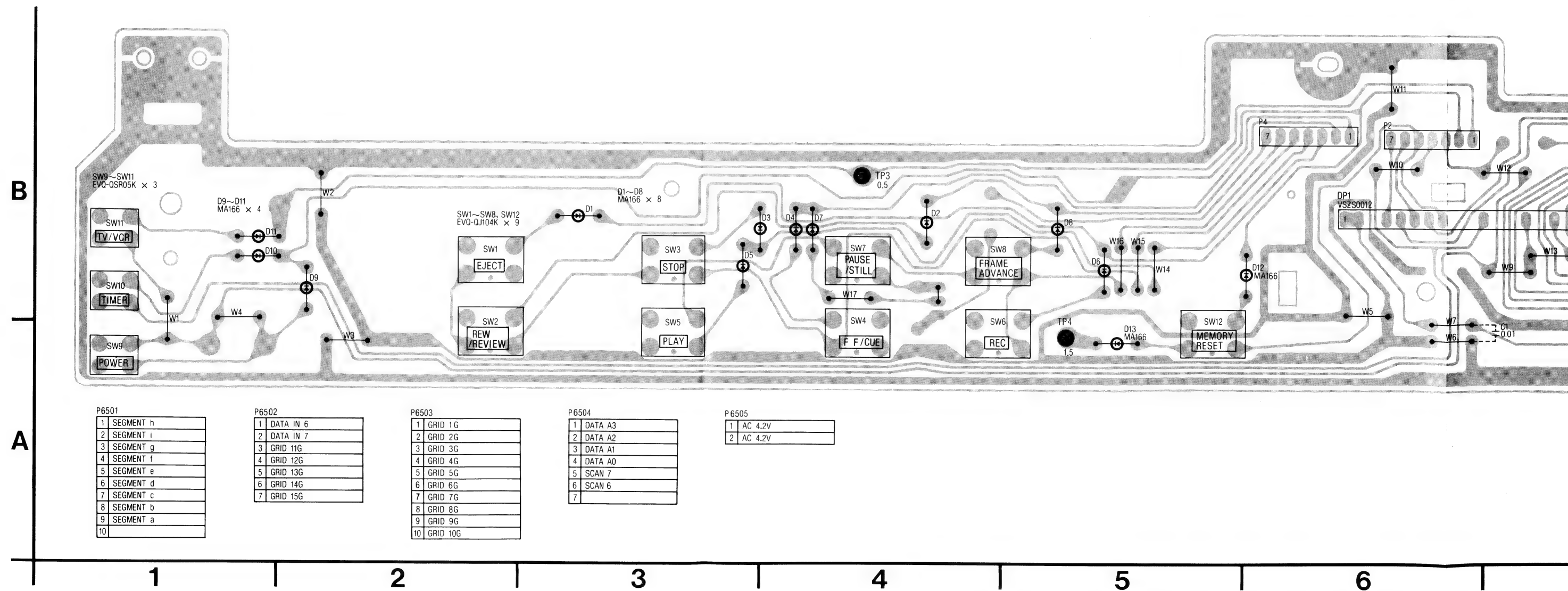
OPERATION C.B.A.

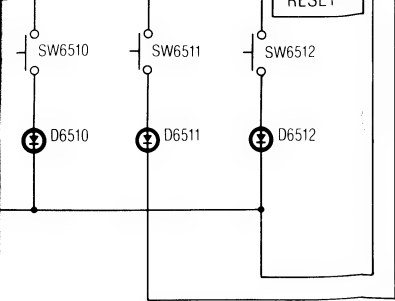




OPERATION C.B.A. VEPS0686A

VOLTAGE MEASUREMENT: COLOR BAR SIGNAL IN SP REC MODE.



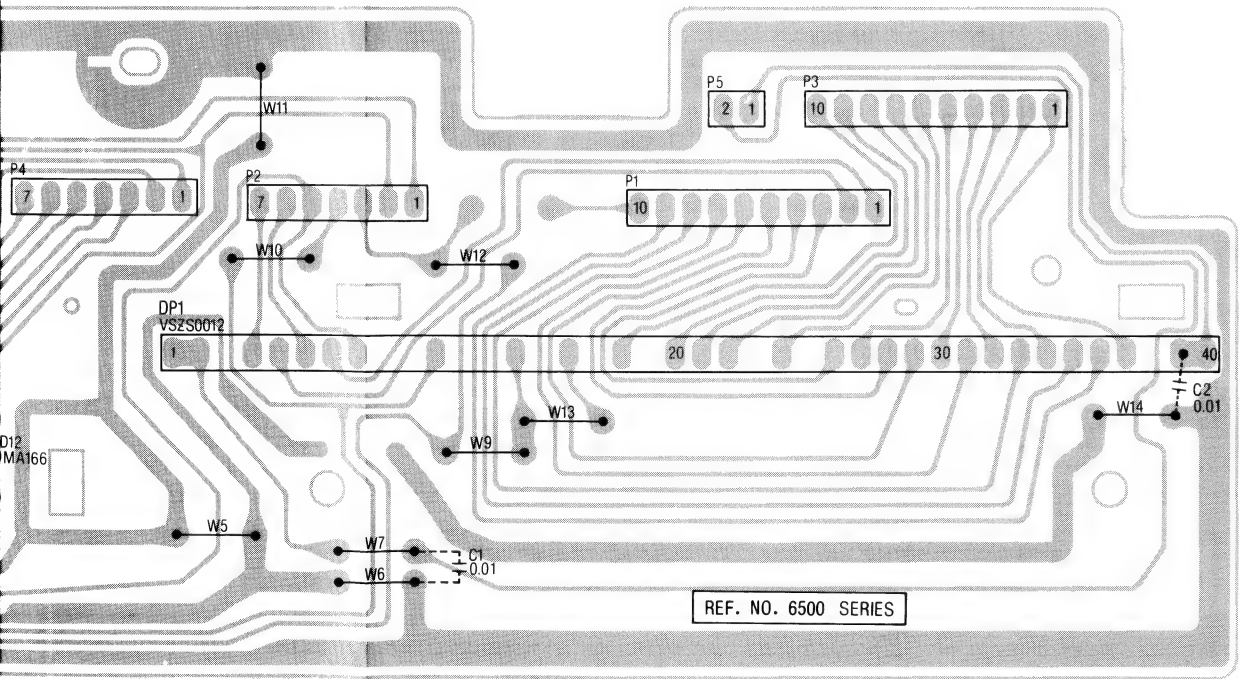


NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE: C.B.A. ...R2, REF. NO. 6500 SERIES
 SCHEMATIC DIAGRAM...R6502
 (R6502 IS ABBREVIATED TO R2)

VJBS0686

6

BAR SIGNAL
 EC MODE.



VJBS0686

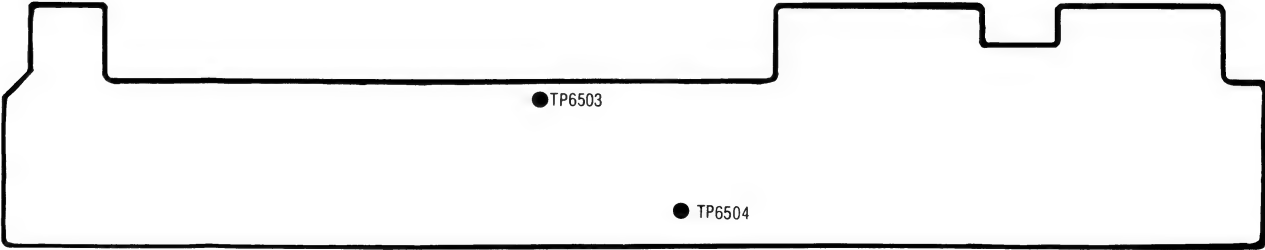
OPERATION C.B.A.



TP NO.	STOP	REC	PLAY	CUE	REV
TP6503	3.9	0.5	0.5	0.5	3.9
TP6504	1.3	1.5	1.4	1.4	1.5

VOLTAGE MEASUREMENT:
 1. CUE, REVIEW
 COLOR BAR SIGNAL IN SLP MODE.
 2. OTHERS
 COLOR BAR SIGNAL IN SP MODE.

LOCATION OF TEST POINTS




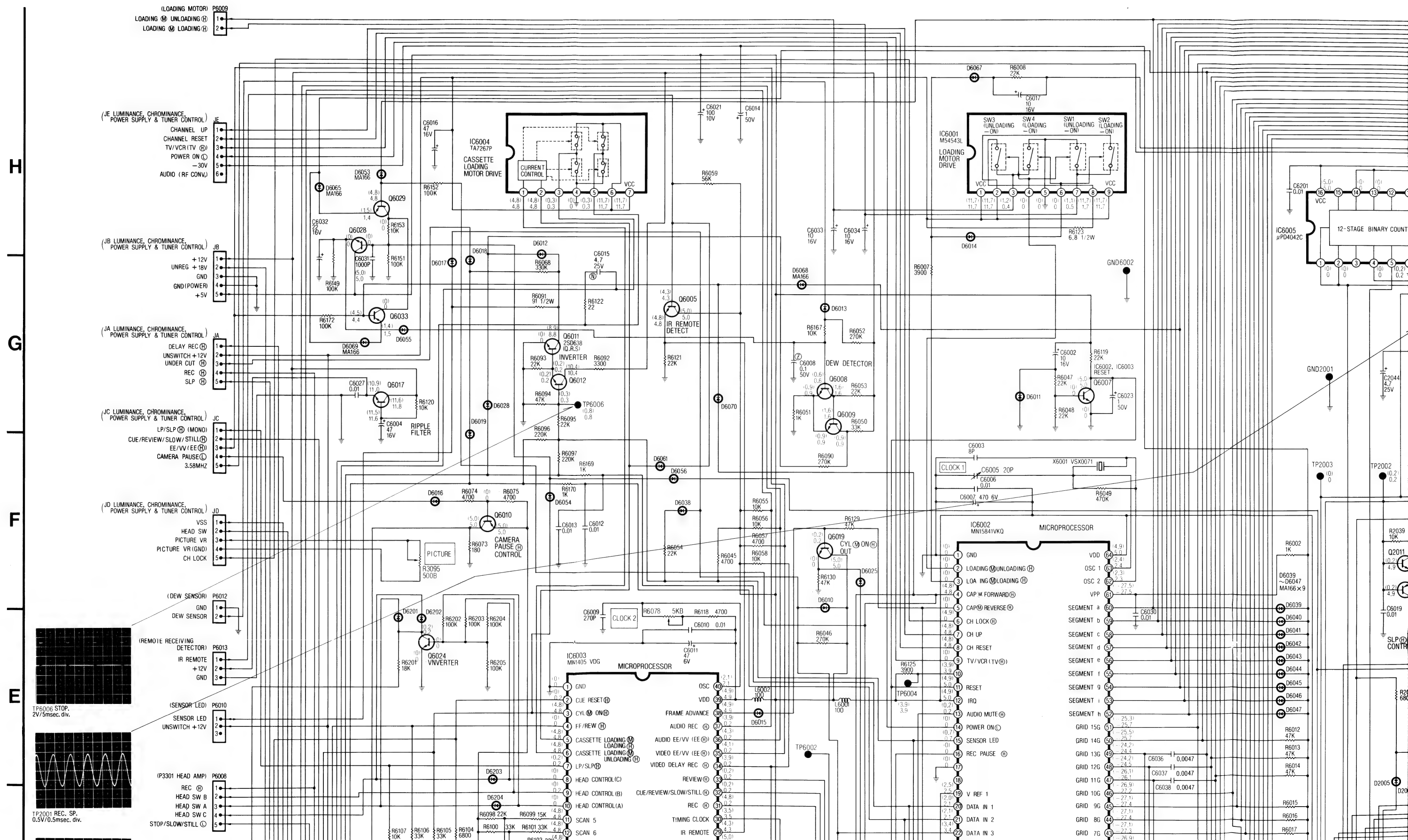
6

7

8

SERVO & SYSTEM CONTROL SCHEMATIC DIAGRAM

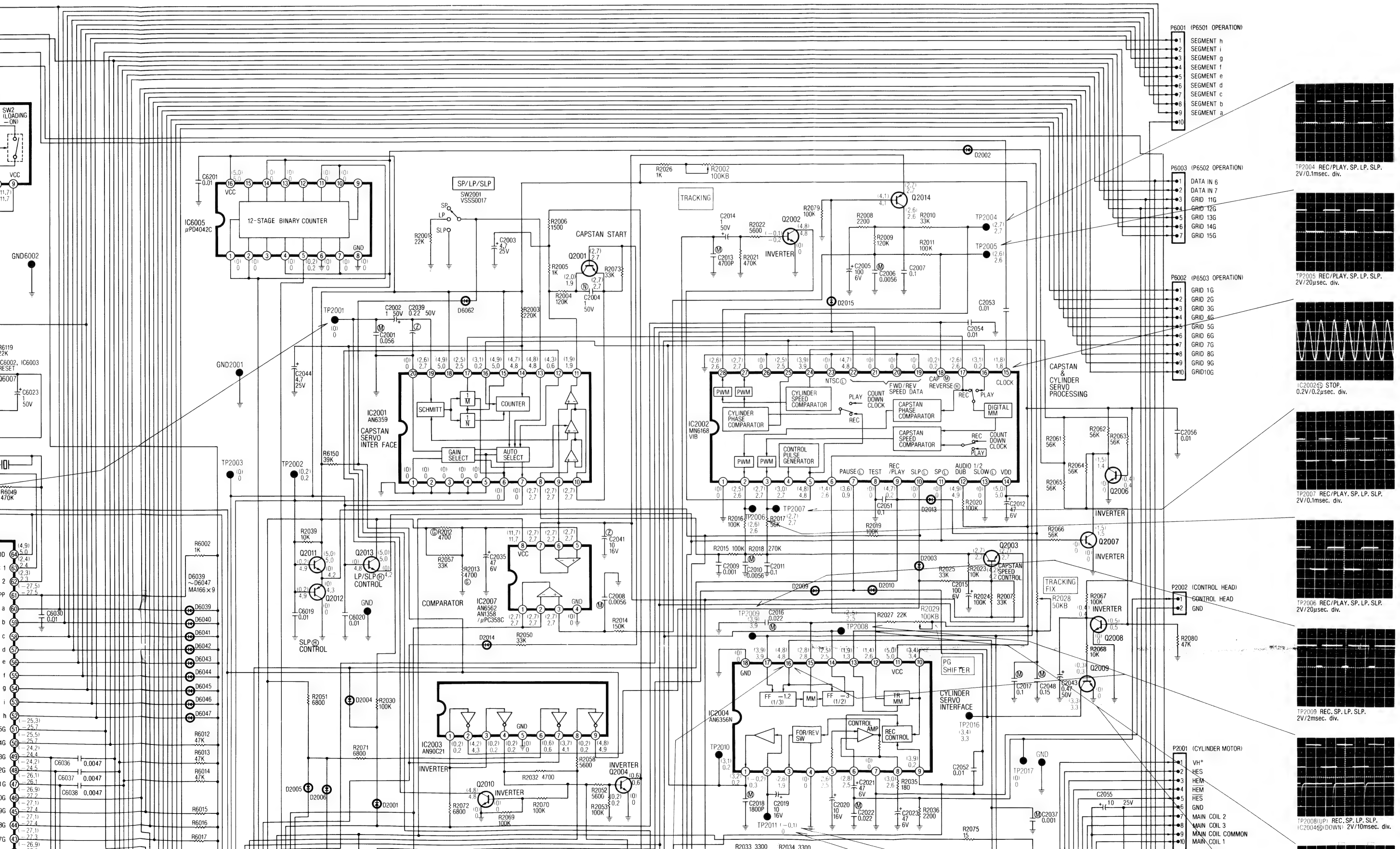
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.



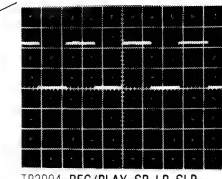
NOTICE:
BY THE SIGN  HAVE SPECIAL
IMPORTANT FOR SAFETY.
IF THESE COMPONENTS,USE ONLY THE
PARTS.

VOLTAGE MEASUREMENTS:
COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.
COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

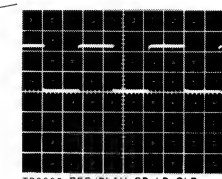
CALLOUTS NEXT TO WIRING PLUGS INDICATE
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.



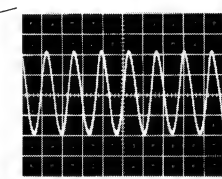
- P6001 (P6501 OPERATION)
- 1 SEGMENT h
 - 2 SEGMENT i
 - 3 SEGMENT g
 - 4 SEGMENT f
 - 5 SEGMENT e
 - 6 SEGMENT d
 - 7 SEGMENT c
 - 8 SEGMENT b
 - 9 SEGMENT a
 - 10



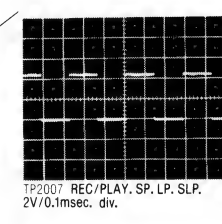
- P6003 (P6502 OPERATION)
- 1 DATA IN 6
 - 2 DATA IN 7
 - 3 GRID 11G
 - 4 GRID 12G
 - 5 GRID 13G
 - 6 GRID 14G
 - 7 GRID 15G



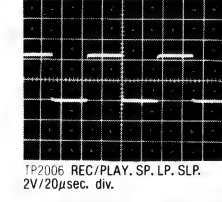
- P6002 (P6503 OPERATION)
- 1 GRID 1G
 - 2 GRID 2G
 - 3 GRID 3G
 - 4 GRID 4G
 - 5 GRID 5G
 - 6 GRID 6G
 - 7 GRID 7G
 - 8 GRID 8G
 - 9 GRID 9G
 - 10 GRID 10G



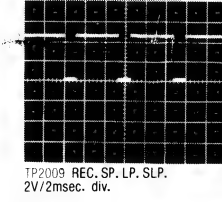
- P6004 (P6504 OPERATION)
- 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10



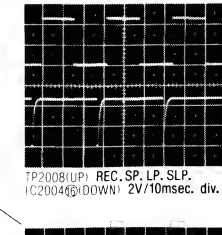
- P6005 (P6505 OPERATION)
- 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10



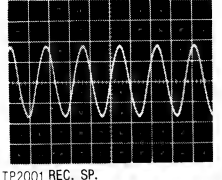
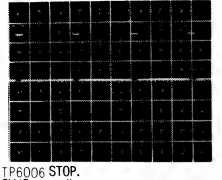
- P6006 (P6506 OPERATION)
- 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10



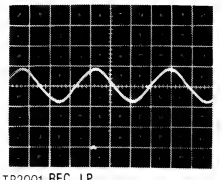
- P2001 (CYLINDER MOTOR)
- 1 VH*
 - 2 HES
 - 3 HEM
 - 4 HEM
 - 5 HES
 - 6 GND
 - 7 MAIN COIL 2
 - 8 MAIN COIL 3
 - 9 MAIN COIL COMMON
 - 10 MAIN COIL 1



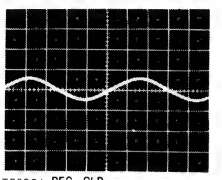
E



D

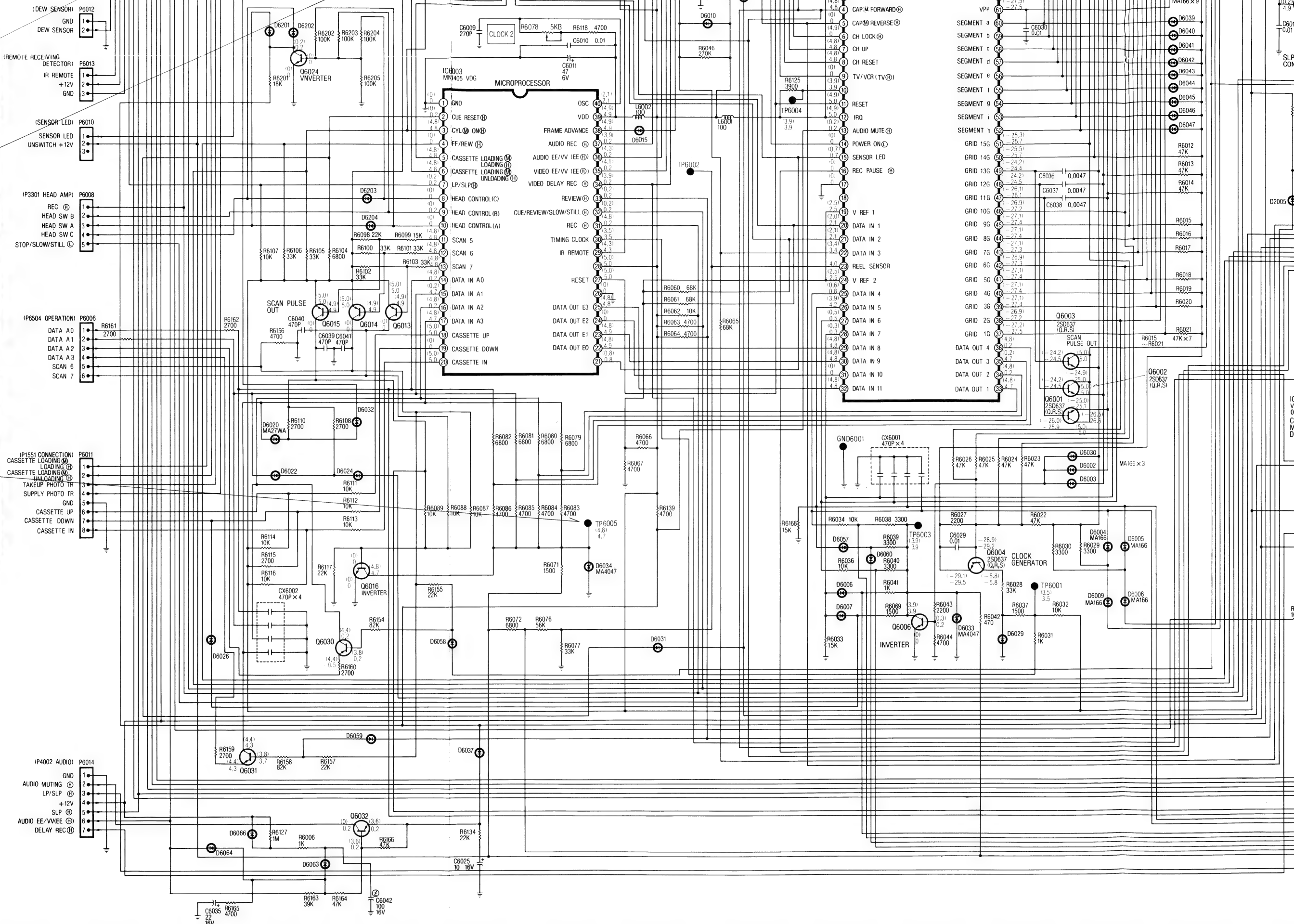


C



B

A



1

2

3

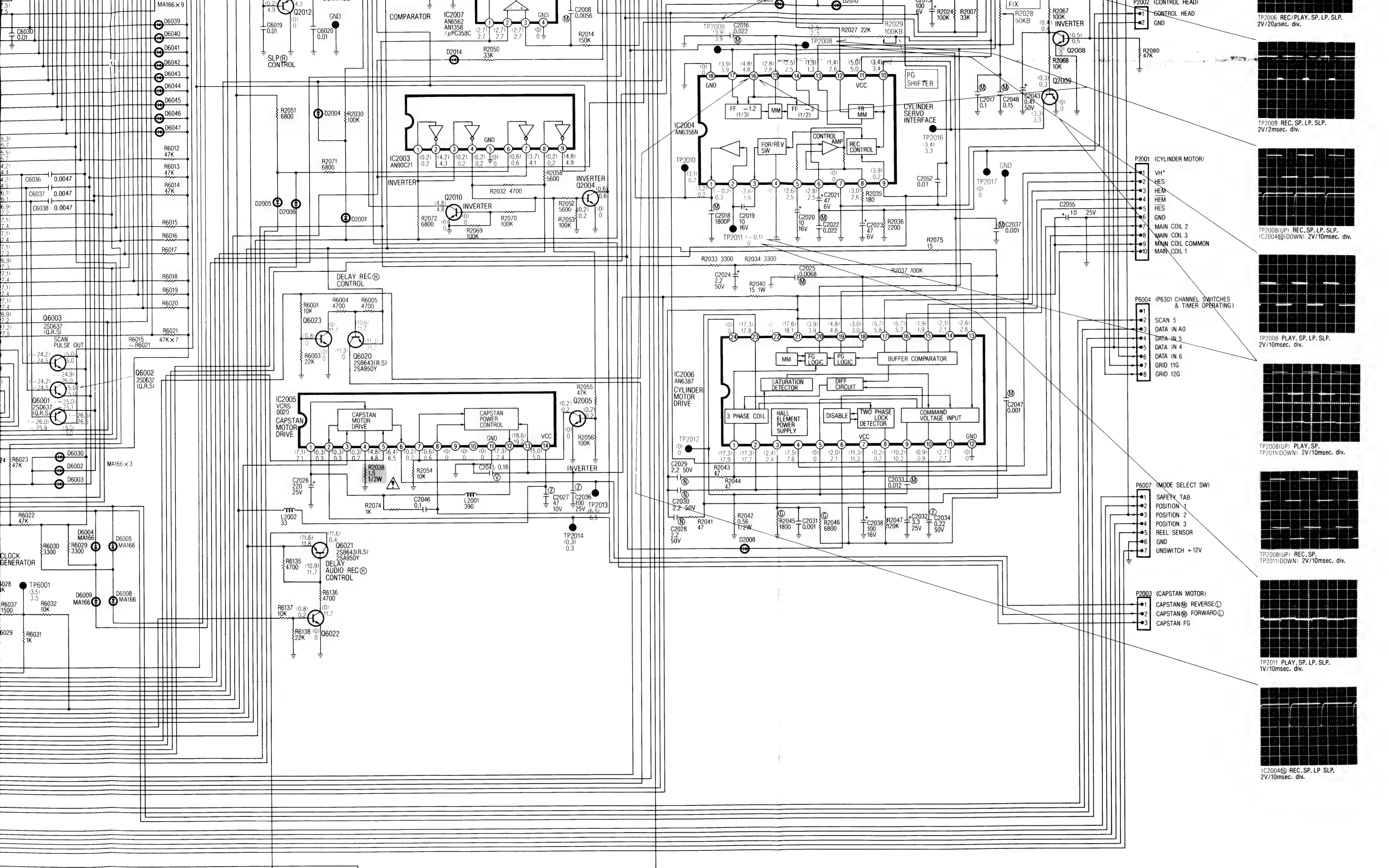
4

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8



UNLESS OTHERWISE SPECIFIED:
 PNP TRANSISTORS ARE 2SB641(Q,R,S)
 NPN TRANSISTORS ARE 2SD636(Q,R,S)
 DIODES ARE MA165/1SS119 AND
 WATTAGE OF RESISTORS ARE 1/4W.

VJBS0236

SERVO SECTION
 NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE: C.B.A. ...R2, REF. NO. 2000 SERIES
 SCHEMATIC DIAGRAM...R2002
 (R2002 IS ABBREVIATED TO R2)

SYSTEM CONTROL SECTION
 NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE: C.B.A. ...R2, REF. NO. 6000 SERIES
 SCHEMATIC DIAGRAM...R6002
 (R6002 IS ABBREVIATED TO R2)

IC6002 MATRIX CHART IC6003

4-3
SYSTEM CONTROL CIRCUIT
IC6002, IC6003 MATRIX CHART

(SCHEMATIC)

SYSTEM CONTROL SECTION	
Q6001	7-C
Q6002	7-C
Q6003	7-D
Q6004	6-B
Q6005	4-G
Q6006	6-B
Q6007	6-G
Q6008	5-G
Q6009	5-G
Q6010	3-F
Q6011	3-G
Q6012	3-G
Q6013	3-D
Q6014	3-D
Q6015	3-D
Q6016	3-B
Q6017	2-G
Q6018	6-G
Q6019	5-F
Q6020	9-D
Q6021	8-C
Q6022	8-B
Q6023	8-D
Q6024	3-E
Q6025	7-G
Q6028	2-H
Q6029	2-H
Q6030	3-B
Q6031	2-A
Q6032	3-A
Q6033	2-G

SERVO SECTION	
Q2001	10-G
Q2002	11-H
Q2003	12-F
Q2004	10-D
Q2005	10-C
Q2006	13-F
Q2007	13-F
Q2008	13-E
Q2009	13-E
Q2010	9-D
Q2011	8-F
Q2012	8-F
Q2013	9-D
Q2014	11-H

IC6002 MATRIX CHART[I]

SCAN OUT	DATA IN			
PIN NO.	25 (DATA IN ₄)	26 (DATA IN ₅)	27 (DATA IN ₆)	28 (DATA IN ₇)
50 (SCAN 4)	★POSITION 1 (SEE CHART [II])	★POSITION 2 (SEE CHART [II])	★POSITION 3 (SEE CHART [II])	SAFETY TAB
49 (SCAN 3)	SLP	LP/SLP	———	COUNTER RESET
48 (SCAN 2)	TIME SET	SELECT	MODE	TIMER SET
47 (SCAN 1)	———	OTR	TV/VCR	POWER

IC6003 MATRIX CHART

SCAN OUT	DATA IN			
PIN NO.	17 (DATA IN _{A3})	16 (DATA IN _{A2})	15 (DATA IN _{A1})	14 (DATA IN _{A0})
13 (SCAN 7)	FF	REW	EJECT	STOP
12 (SCAN 6)	PAUSE	FRAME ADVANCE	REC	PLAY
11 (SCAN 5)	CAMERA PAUSE	AUDIO MUTING	LP/SLP	———

IC6002 MATRIX CHART[II](MODE SWITCH POSITION CODE)

PIN NO. MODE SWITCH POSITION	★POSITION 1	★POSITION 2	★POSITION 3
	25 (DATA IN ₄)	26 (DATA IN ₅)	27 (DATA IN ₆)
PLAY	L	H	L
PAUSE	L	H	H
REVIEW	H	L	L
STOP	H	L	H
FF/REW	H	H	L

IC6002 MATRIX CHART[III]

	DATA IN		
PIN NO.	20 (DATA IN ₁)	21 (DATA IN ₂)	22 (DATA IN ₃)
15 (L)	DEW (H)	UNDER CUT (H)	CYLINDER LOCK (L)
15 (H)	TAKEUP PHOTO TR (L)	SUPPLY PHOTO TR (L)	SENSOR LED (H)

4-4
SERVO & SYSTEM CONTROL
CIRCUIT VOLTAGE CHART

VOLTAGE MEASUREMENT:
1. CUE, REVIEW, FRAME ADVANCE.
COLOR BAR SIGNAL IN SLP MODE.
2. OTHERS
COLOR BAR SIGNAL IN SP MODE.
★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.


	STOP			REC			PLAY			CUE			REV			F.A.		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q2001	2.6	2.1	2.7	2.7	2.7	2.0	2.7	2.7	1.9	2.2	2.2	2.7	2.7	2.7	2.8	2.7	2.1	2.7
Q2002	0	-0.1	4.8	0	-0.1	4.8	0	-0.2	4.8	0	-0.2	4.9	0	-0.1	4.8	0	0	4.8
Q2003	2.7	2.1	2.7	2.7	4.2	2.7	2.7	4.2	2.7	2.7	4.2	3.0	2.7	2.4	2.5	2.7	4.3	2.3
Q2004	0	0	0.7	0	0.2	0.6	0	0.2	0.6	0	0.8	0	0	0	0.6	0	0.8	0
Q2005	0	0	0	0	0.2	0.2	0	0.2	0.2	0	0.7	0	0	0	0.2	0	0.7	0
Q2006	0	0	2.8	0	0.4	1.5	0	0.4	1.4	0	0.4	1.5	0	0.4	0	0	0.4	1.4
Q2007	0	0	2.8	0	0	1.5	0	0	1.5	0	0	1.5	0	0.7	0	0	0	1.5
Q2008	0	0.7	0	0	0.5	0.4	0	0.5	0.4	0	0.5	0.4	0	0.4	0.4	0	0.5	0.4
Q2009	0	0	5.0	0	0.3	3.3	0	0.3	3.3	0	0.3	3.3	0	0.3	3.3	0	0.3	3.4
Q2010	0	0	4.8	0	0	4.8	0	0	4.8	0	0	4.8	0	0	4.8	0	0	4.8
Q2011	0	0.2	5.0	0	0.2	5.0	4.2	4.9	5.0	0	0.2	5.0	4.3	4.9	5.0	0	0.2	5.0
Q2012	0	0.2	0	0	0.2	0	4.3	4.9	0	0	0.3	3.4	0	0.3	3.3	0	0.3	3.4
Q2013	0	0	5.0	0	0	5.0	4.2	4.8	5.0	0	0	5.0	4.2	4.8	5.0	0	0	5.0
Q2014	2.7	2.1	2.7	2.7	4.1	2.6	2.7	4.1	2.6	2.7	3.8	2.7	2.7	4.1	2.6	2.7	4.1	2.7

TP NO.	STOP	REC	PLAY	CUE	REV	F.A.
TP2001	0	0	0	0	0	0
TP2002	0.2	0.2	0.2	0.2	4.9	0.2
TP2003	0	0	0	0	4.8	0.2
TP2004	2.6	2.7	2.7	2.8	2.7	2.7
TP2005	0.3	2.6	2.6	2.6	2.6	2.7
TP2006	0.3	2.6	2.6	5.0	2.6	0.3
TP2007	2.6	2.7	2.7	1.9	2.7	2.6
TP2008	0	2.5	2.5	2.5	2.5	2.6
TP2009	5.0	3.9	3.9	3.9	3.9	4.0
TP2010	0.2	3.1	0.2	0.3	0.3	0.2
TP2011	0.5	-0.1	0	-0.2	-0.3	0.6
TP2012	0	0	0	0	0	0.2
TP2013	0	6.5	6.5	17.4	0.3	18.7
TP2014	0	0.3	0.3	0.3	2.5	18.0
TP2016	0	3.4	3.3	3.4	3.4	3.4
TP2017	0	0	0	0	0	0

	STOP			FF			REW			REC			PLAY			CUE			REV			F-A		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q6001	-27.3	-26.8	5.0	-27.1	-26.3	5.0	-26.8	-26.1	5.0	-26.5	-26.0	5.0	-26.6	-25.9	5.0	-26.6	-26.0	5.0	-26.5	-26.1	5.0	-26.6	-25.9	5.0
Q6002	-25.5	-24.9	5.0	-25.2	-24.7	5.0	-25.1	-24.4	5.0	-25.0	-24.2	5.0	-25.1	-24.5	5.0	-24.9	-24.5	5.0	-25.1	-24.3	5.0	-25.1	-24.3	5.0
Q6003	-25.5	-24.9	5.0	-25.3	-24.6	5.0	-25.0	-24.4	5.0	-24.9	-24.2	5.0	-25.0	-24.5	5.0	-25.1	-24.3	5.0	-24.9	-24.4	5.0	-25.1	-24.3	5.0
Q6004	-29.5	-29.2	-5.7	-29.5	-29.1	-5.8	-29.4	-29.1	-5.8	-29.1	-28.9	-5.8	-29.5	-29.2	-5.8	-29.5	-29.1	-5.8	-29.5	-29.1	-5.9	-29.5	-29.1	-5.9
Q6005	4.8	4.3	5.0	4.8	4.3	5.0	4.8	4.3	5.0	4.8	4.3	5.0	4.8	4.3	5.0	4.8	4.3	5.0	4.8	4.3	5.0	4.8	4.3	5.0
Q6006	0	0.2	3.9	0	0.2	3.9	0	0.2	3.9	0	0.3	3.9	0	0.2	3.9	0	0.3	3.9	0	0.3	3.9	0	0.3	3.9
Q6007	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0
Q6008	0.9	0.6	1.5	0.9	0.5	1.5	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.6	1.6	0.9	0.5	1.6
Q6009	0.9	1.5	0.9	0.9	1.6	0.9	0.9	1.5	0.9	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9	0.9	1.6	0.9	1.6	0.9	0.9
Q6010	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0	5.0	0	5.0
Q6011	0	0.2	8.8	0	0.2	8.8	0	0.2	8.8	0	0.2	8.8	0	0.2	8.8	0	0.2	8.8	0	0.2	8.8	0.1	0.2	8.8
Q6012	0.2	0.3	10.4	0.2	0.3	10.4	0.2	0.3	10.4	0.2	0.3	10.4	0.2	0.3	10.4	0.2	0.3	10.4	0.2	0.3	10.4	0.2	0.3	10.4
Q6013	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0
Q6014	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0
Q6015	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0	5.0	4.9	0
Q6016	0	0	4.6	0	0	4.7	0	0	4.7	0	0	4.8	0	0	4.7	0	0	4.7	0	0	4.8	0	0	4.7
Q6017	10.9	11.5	11.7	20.9	11.6	11.7	10.9	11.5	11.7	10.9	11.5	11.6	11.0	11.6	11.8	10.9	11.6	11.7	11.0	11.6	11.8	21.0	11.6	11.7
Q6018	0.1	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0	0	0.7	0
Q6019	4.3	4.9	5.0	0	0.2	5.0	4.3	4.9	5.0	0	0.2	5.0	0	0.2	5.0	0	0.2	5.0	4.3	4.9	5.0	4.1	4.7	5.0
Q6020	11.7	11.7	0	11.7	11.7	0	11.7	11.7	0	11.3	10.6	11.3	11.7	11.7	0	11.8	11.7	0	11.7	11.7	0	11.7	11.7	0
Q6021	11.7	11.7	0.4	1.7	11.7	0.4	11.7	11.7	0.5	11.6	10.9	11.6	11.8	11.7	0.4	11.7	11.7	0.4	11.7	11.7	0.4	11.7	11.7	0.4
Q6022	0	0.2	11.7	0	0.2	11.7	0	0.2	11.7	0	0.8	0	0	0.2	11.7	0	0.2	11.7	0	0	11.7	0	0.2	11.7
Q6023	0	0	11.7	0	0	11.7	0	0	11.7	0	0.8	0	0	0	11.7	0	0	11.7	0	0	11.7	0	0	11.7
Q6024	0	0	0.2	0	0	0.2	0	0	0.2	0	0	0.2	0	0	0.2	0	0	11.7	0	0	11.7	0	0	11.7
Q6028	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0	0	0	5.0	0	0	0.7	0	0	0.7	0	0	0.7
Q6029	1.5	4.8	0	1.4	4.8	0	0.3	2.3	0	1.5	4.8	0	1.4	4.8	0	5.0	0	0	5.0	0	0	5.0	0	0
Q6030	-0.8	0.2	0.2	4.3	3.8	4.3	4.3	3.8	4.3	4.4	3.8	4.4	-0.5	0.2	0.2	4.3	1.5	0	0.3	2.3	0	1.5	4.8	0
Q6031	4.2	3.6	4.2	4.3	3.7	4.2	4.3	3.7	4.3	4.4	3.8	4.4	4.3	3.7	4.3	0.2	4.3	4.4	3.8	4.4	4.3	4.3	3.7	4.3
Q6032	3.6	3.6	0.2	3.6	3.6	0.2	3.6	3.6	0	3.6	3.6	0	0.2	0.2	0.2	3.8	3.1	3.7	3.8	3.2	3.8	3.8	3.1	3.8
Q6033	1.5	4.5	0	1.5	4.5	0	1.5	4.4	0	1.4	4.5	0	1.5	4.4	0	1.5	4.4	0	0.3	0	0	1.5	4.4	0

TP NO.	STOP	FF	REW	REC	PLAY	CUE	REV	F-A
TP6001	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
TP6002	4.0	2.1	2.1	★	★	★	★	4.0
TP6003	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
TP6004	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
TP6005	4.6	4.7	4.7	4.8	4.7	4.7	4.8	4.7
TP6006	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

SERVO & SYSTEM CONTROL C.B.A. (VEPS0236A1)

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.

VOLTAGE MEASUREMENT

E

D

C

B

P2001

1	VH*
2	HES
3	HEM
4	HEM
5	HES
6	GND
7	MAIN COIL 2
8	MAIN COIL 3
9	MAIN COIL COMMON
10	MAIN COIL 1

P2002

1	CONTROL
2	GND

P2003

1	CAPSTAN@REVERSE
2	CAPSTAN@FORWARD
3	CAPSTAN FG

JA

1	DELAY REC
2	UNSWITCH +12V
3	UNDER CUT
4	REC
5	SLP

JB

1	+12V
2	UNREG +18V
3	GND
4	GND(POWER)
5	+5V

JC

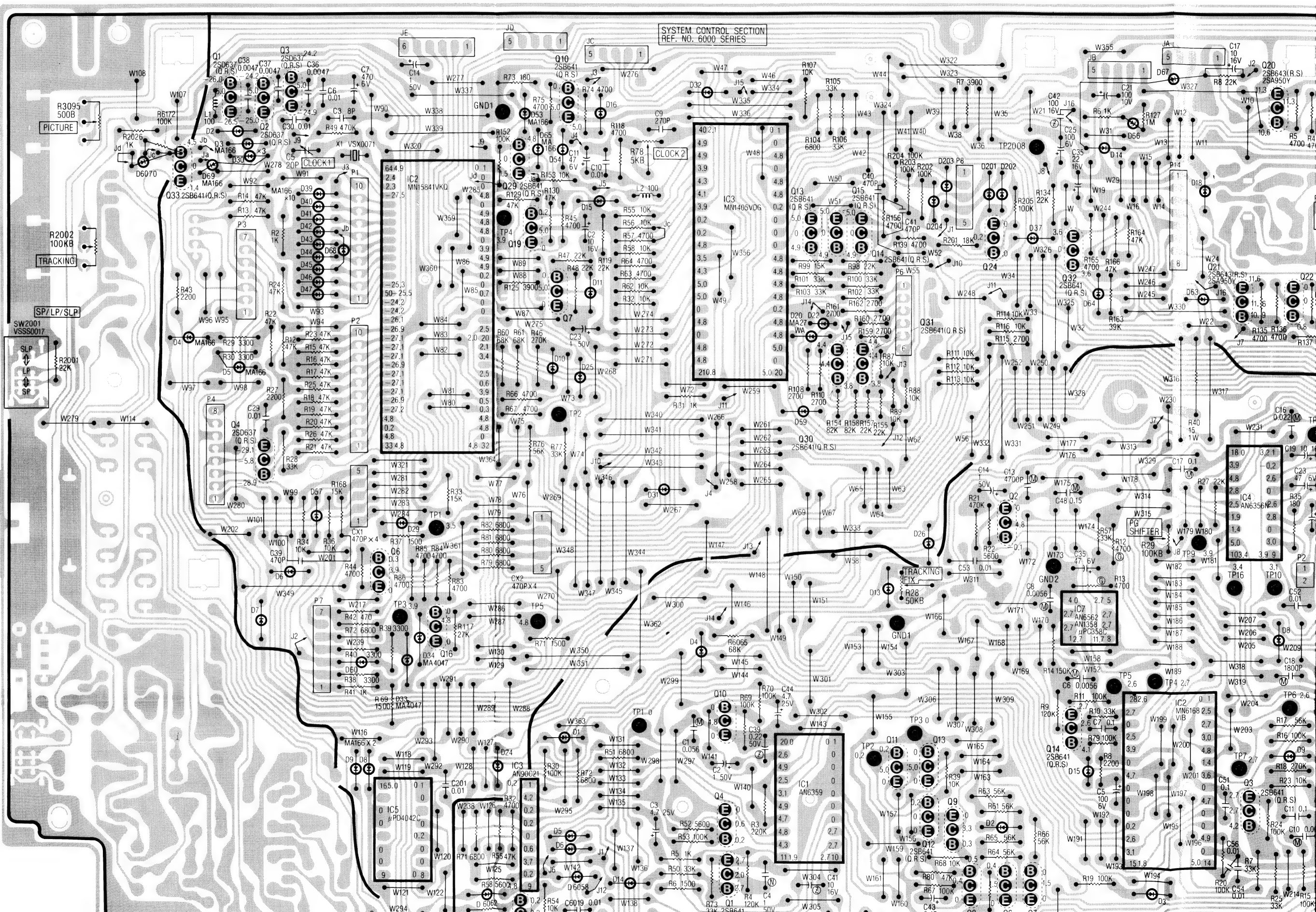
1	LP/SLP (MONO)
2	CUE/REVIEW/SLOW/STILL
3	EE/VV(EE)
4	CAMERA PAUSE
5	3.58MHZ

JD

1	VSS
2	HEAD SW
3	PICTURE VR
4	PICTURE VR (GND)
5	CH LOCK

JE

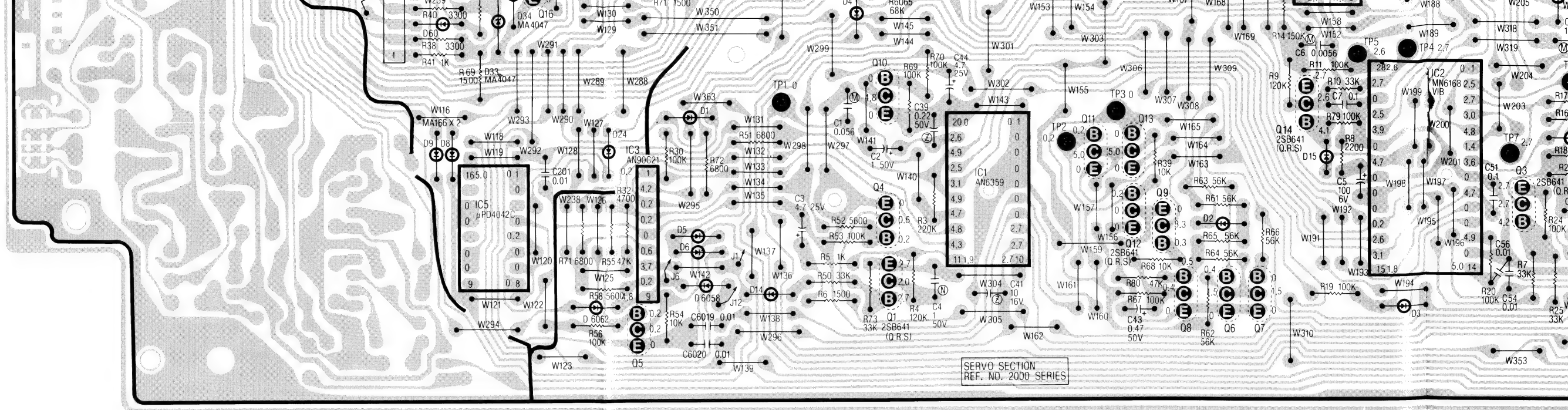
1	CHANNEL UP
2	CHANNEL REST
3	TV/VCR(TV)
4	POWER ON
5	-30V
6	AUDIO(RF CONV)



5	3.58MHZ
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JD	1 VSS
	2 HEAD SW
	3 PICTURE VR
	4 PICTURE VR (GND)
	5 CH LOCK

JE	1 CHANNEL UP
	2 CHANNEL REST
	3 TV/VCR(TVⓈ)
	4 POWER ONⓈ
	5 -30V
	6 AUDIO/RF CONV



P6001

1	SEGMENT h
2	SEGMENT i
3	SEGMENT g
4	SEGMENT f
5	SEGMENT e
6	SEGMENT d
7	SEGMENT c
8	SEGMENT b
9	SEGMENT a

P6002

1	GRID 1G
2	GRID 2G
3	GRID 3G
4	GRID 4G
5	GRID 5G
6	GRID 6G
7	GRID 7G
8	GRID 8G
9	GRID 9G
10	GRID 10G

P6003

1	DATA IN6
2	DATA IN7
3	GRID 11G
4	GRID 12G
5	GRID 13G
6	GRID 14G
7	GRID 15G

P6004

1	
2	SCAN 5
3	DATA INA0
4	DATA IN5
5	DATA IN4
6	DATA IN6
7	GRID 11G
8	GRID 12G

P6006

1	DATA A0
2	DATA A1
3	DATA A2
4	DATA A3
5	SCAN 6
6	SCAN 7

P6007

1	SAFETY TAB
2	POSITION 1
3	POSITION 2
4	POSITION 3
5	REEL SENSOR
6	GND
7	UNSWITCH +12V

P6008

1	RECⓈ
2	HEAD SW B
3	HEAD SW A
4	HEAD SW C
5	STOP/SLOW/STILLⓈ

P6009

1	LOADINGⓈUNLOADINGⓈ
2	LOADINGⓈLOADINGⓈ

P6010

1	SENSOR LED
2	UNSWITCH +12V

P6011

1	CASSETTE LOADINGⓈ
2	CASSETTE LOADINGⓈUNLOADINGⓈ
3	TAKEUP PHOTO TR
4	SUPPLY PHOTO TR
5	GND
6	CASSETTE UP
7	CASSETTE DOWN

P6012

1	GND
2	DEW SENSOR

PIN NO.	IC 2001					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	0	0	0	0	0	0
PIN 2	0	0	0	0	0	0
PIN 3	0	0	0	0	0	0
PIN 4	0	0	0	0	0	0
PIN 5	0	0	0	0	0	0
PIN 6	4.9	0	0	0	4.9	0.2
PIN 7	4.8	0	0	4.8	4.8	0.2
PIN 8	1.0	2.7	2.7	4.3	2.7	1.0
PIN 9	2.7	2.7	2.7	2.7	2.6	2.8
PIN 10	2.5	2.7	2.7	2.4	2.7	2.7
PIN 11	3.9	1.9	1.9	3.8	2.7	3.9
PIN 12	3.8	4.3	0.6	0.6	3.7	0.5
PIN 13	0	4.8	4.8	0	0	0.7
PIN 14	4.8	4.7	4.8	4.7	4.7	0
PIN 15	5.0	4.9	5.0	5.0	4.9	5.1
PIN 16	0.2	3.1	0.2	0.4	0.4	0.2
PIN 17	5.0	2.5	2.5	2.5	2.6	★
PIN 18	5.0	4.9	5.0	5.0	4.9	5.1
PIN 19	2.7	2.6	2.7	2.7	2.7	2.8
PIN 20	0	0	0	0	0	0

PIN NO.	IC 2002					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	0	0	0	0	0	0
PIN 2	0.3	2.5	2.6	4.9	2.6	0.3
PIN 3	2.6	2.7	2.7	★	★	2.6
PIN 4	★	★	★	★	★	★
PIN 5	4.8	4.8	4.8	4.8	4.8	4.9
PIN 6	0	1.4	2.6	2.6	2.5	2.6
PIN 7	0.9	3.6	0.9	0.6	0.7	0.9
PIN 8	0	0	0	0	0	0
PIN 9	0.2	4.7	0.2	0.2	0.2	0.3
PIN 10	0	0	0	0	0.6	0
PIN 11	0	0	0	0	4.1	0
PIN 12	5.0	4.9	4.9	4.9	4.9	5.0
PIN 13	0	0	0	0	0	0
PIN 14	5.0	5.0	5.0	5.0	5.0	5.1
PIN 15	1.8	1.8	1.8	1.8	1.8	1.8
PIN 16	0.2	3.1	0.2	0	0	0.2
PIN 17	5.0	2.6	2.6	2.5	2.5	★
PIN 18	4.2	0.2	0.2	0.2	4.2	0.3
PIN 19	0	0	0	0	0	0
PIN 20	0	0	0	0	0	0
PIN 21	0	0	0	0	0	0.2
PIN 22	0	4.7	4.8	4.7	4.5	4.8
PIN 23	0	0	0	0	0	0
PIN 24	5.0	3.9	3.9	3.9	3.9	4.0
PIN 25	0	2.5	2.5	2.5	2.5	2.6
PIN 26	0	0	0	0	0	0
PIN 27	2.6	2.7	2.7	2.6	2.7	2.7
PIN 28	0.3	2.6	2.6	2.6	2.6	2.7

PIN NO.	IC 2003					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	2.2	0.2	0.2	0.2	2.2	0.2
PIN 2	0	4.2	4.3	4.2	0	4.3
PIN 3	2.2	0.2	0.2	0.2	2.2	0.2
PIN 4	0	0.2	0.2	2.4	0.2	2.4
PIN 5	0	0	0	0	0	0
PIN 6	2.5	0.6	0.6	0.6	0.6	2.5
PIN 7	0	3.7	4.1	3.7	3.7	0
PIN 8	0.2	0.2	0.2	2.8	2.5	2.7
PIN 9	4.9	4.8	4.9	0	0	0

PIN NO.	IC 2004					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	0.2	3.2	0.2	0	0.5	0.2
PIN 2	0.5	-0.2	0.3	-0.5	-0.5	0.6
PIN 3	1.9	2.6	1.9	2.0	2.0	1.7
PIN 4	0	0	0	0	0	0
PIN 5	2.5	2.6	2.5	2.6	2.6	2.6
PIN 6	2.6	2.8	2.5	2.6	2.6	2.7
PIN 7	0	0	0	0	0	0
PIN 8	2.6	3.0	2.6	2.6	2.6	2.7
PIN 9	0.2	3.9	0.2	0.2	0.2	0.2
PIN 10	0	3.4	3.4	3.4	3.4	3.4
PIN 11	5.0	5.0	5.0	5.0	5.0	5.1
PIN 12	0	1.4	2.6	2.6	2.6	2.6
PIN 13	0	1.9	1.3	1.3	1.3	1.4
PIN 14	0	2.5	2.5	2.5	2.6	2.6
PIN 15	4.8	2.8	2.8	2.8	2.8	2.9
PIN 16	5.0	4.8	4.8	4.8	4.8	4.9
PIN 17	5.0	3.9	3.9	3.9	3.9	4.0
PIN 18	0	0	0	0	0	0

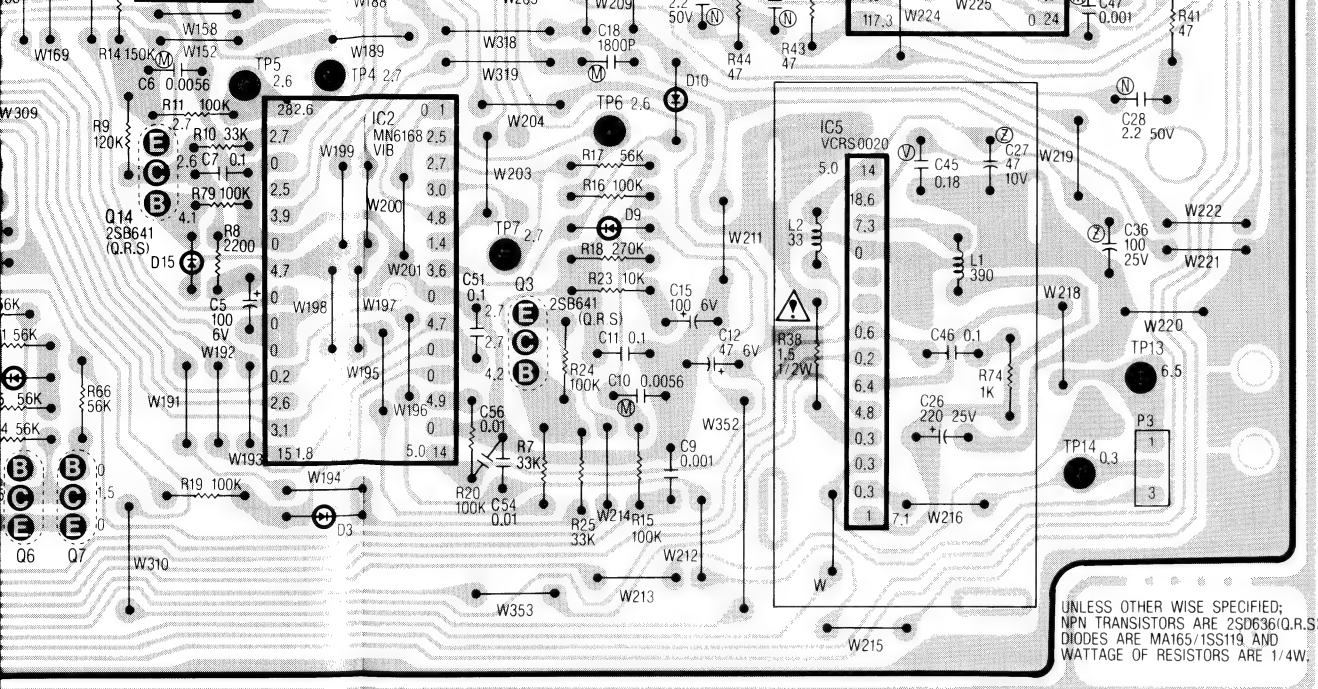
PIN NO.	IC 2005					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	0.2	7.1	7.1	18.0	3.0	18.7
PIN 2	0	0.3	0.3	0.3	2.4	18.1
PIN 3	3.8	0.3	0.3	0.3	3.8	3.7
PIN 4	0	0.3	0.2	0.3	0.2	0.2
PIN 5	4.8	4.8	4.8	4.8	0.2	4.9
PIN 6	0	6.4	6.5	17.3	0.2	18.7
PIN 7	0	0.2	0.2	0	0.2	0
PIN 8	0.7	0.6	0.6	0	0.6	0.2
PIN 9	★	★	★	★	★	★
PIN 10	★	★	★	★	★	★
PIN 11	0	0	0	0	0	0
PIN 12	0	7.3	7.4	18.1	3.2	18.7
PIN 13	19.2	18.6	19.2	18.8	19.4	19.2
PIN 14	5.0	5.0	5.0	5.0	5.0	5.1

PIN NO.	IC 2007					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	1.2	2.7	2.7	2.7	2.7	2.7
PIN 2	1.2	2.7	2.7	2.7	2.7	2.7
PIN 3	1.2	2.7	2.7	2.7	2.7	2.7
PIN 4	0	0	0	0	0	0
PIN 5	2.7	2.7	2.7	2.7	2.7	2.8
PIN 6	2.7	2.7	2.7	2.7	2.7	2.8
PIN 7	2.7	2.7	2.7	2.7	2.7	2.8
PIN 8	11.7	11.7	11.7	11.7	11.8	11.9

PIN NO.	IC 2006					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	19.5	17.3	17.9	17.4	18.3	17.8
PIN 2	19.5	17.3	17.7	17.6	18.3	17.8
PIN 3	2.4	2.4	2.4	2.5	2.4	2.5
PIN 4	7.4	7.5	7.6	7.6	7.5	2.3
PIN 5	0	0	0	0	0	0.2
PIN 6	0.6	2.0	2.1	2.0	2.1	2.1
PIN 7	11.3	11.3	11.3	11.3	11.3	11.7
PIN 8	0.2	0.2	0.2	0.2	0	0.2
PIN 9	10.9	10.2	10.2	10.2	10.1	10.6
PIN 10	0.8	0.9	0.9	0.9	0.9	0.9
PIN 11	2.7	2.7	2.7	2.7	2.7	2.8
PIN 12	0	0	0	0	0	0
PIN 13	1.2	2.6	2.6	2.6	2.6	2.7
PIN 14	1.7	2.1	2.1	2.0	2.0	0.7
PIN 15	1.9	1.9	1.9	1.9	1.9	0.7
PIN 16	5.2	5.7	5.7	5.7	5.7	1.8
PIN 17	5.8	5.7	5.8	5.8	5.7	1.8
PIN 18	0.2	3.0	3.0	2.9	2.9	3.1
PIN 19	5.0	4.8	4.8	4.7	4.7	4.9
PIN 20	4.9	3.9	3.9	3.9	3.9	4.0
PIN 21	19.5	17.6	18.1	17.6	18.4	18.0
PIN 22	★	★	★	★	★	★
PIN 23	19.5	17.3	17.8	17.4	18.2	17.8
PIN 24	0	0	0	0	0	0.2

VOLTAGE MEASUREMENT:
 1. CUE, REVIEW, FRAME ADVANCE.
 COLOR BAR SIGNAL IN SLP MODE.
 2. OTHERS
 COLOR BAR SIGNAL IN SP MODE.

★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.



SENSOR LED	P6011	P6012	P6013	P6014	VJBS0236 ③
NSWITCH +12V	1 CASSETTE LOADING ④	1 GND	1 IR REMOTE	1 GND	
	2 CASSETTE LOADING ④	2 +12V	2 +12V	2 AUDIO MUTING ④	
	3 TAKEUP PHOTO TR	3 GND	3 GND	3 LP/SLP ④	
	4 SUPPLY PHOTO TR			4 +12V	
	5 GND			5 SLP ④	
	6 CASSETTE UP			6 AUDIO EE/VVIEE ④	
	7 CASSETTE DOWN			7 DELAY REC ④	
				8	

6 7 8

PIN NO.	IC 2006					
	STOP	REC	PLAY	CUE	REV	F.A
PIN 1	19.5	17.3	17.9	17.4	18.3	17.8
PIN 2	19.5	17.3	17.7	17.6	18.3	17.8
PIN 3	2.4	2.4	2.4	2.5	2.4	2.5
PIN 4	7.4	7.5	7.6	7.6	7.5	2.3
PIN 5	0	0	0	0	0	0.2
PIN 6	0.6	2.0	2.1	2.0	2.1	2.1
PIN 7	11.3	11.3	11.3	11.3	11.3	11.7
PIN 8	0.2	0.2	0.2	0.2	0	0.2
PIN 9	10.9	10.2	10.2	10.2	10.1	10.6
PIN 10	0.8	0.9	0.9	0.9	0.9	0.9
PIN 11	2.7	2.7	2.7	2.7	2.7	2.8
PIN 12	0	0	0	0	0	0
PIN 13	1.2	2.6	2.6	2.6	2.6	2.7
PIN 14	1.7	2.1	2.1	2.0	2.0	0.7
PIN 15	1.9	1.9	1.9	1.9	1.9	0.7
PIN 16	5.2	5.7	5.7	5.7	5.7	1.8
PIN 17	5.8	5.7	5.8	5.8	5.7	1.8
PIN 18	0.2	3.0	3.0	2.9	2.9	3.1
PIN 19	5.0	4.8	4.8	4.7	4.7	4.9
PIN 20	4.9	3.9	3.9	3.9	3.9	4.0
PIN 21	19.5	17.6	18.1	17.6	18.4	18.0
PIN 22	★	★	★	★	★	★
PIN 23	19.5	17.3	17.8	17.4	18.2	17.8
PIN 24	0	0	0	0	0	0.2

PIN NO.	IC 6004							
	STOP	FF	REW	REC	PLAY	CUE	REV	F-A
PIN 1	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
PIN 2	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
PIN 3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
PIN 4	0	0	0	0	0	0	0	0
PIN 5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
PIN 6	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
PIN 7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7

PIN NO.	IC 6005							
	STOP	FF	REW	REC	PLAY	CUE	REV	F.A
PIN 1	0	0	0	0	0	0	0	0
PIN 2	0	0	0	0	0	0	0	0
PIN 3	★	★	★	★	★	★	★	★
PIN 4	0	0	0	0	0	0	4.6	0
PIN 5	0.2	0.2	0.2	0.2	0.2	4.4	4.4	4.5
PIN 6	0	0	0	0	0	0	0	0
PIN 7	0	0	0	0	0	0	4.6	0
PIN 8	0	0	0	0	0	0	0	0
PIN 9	★	★	★	★	★	★	★	★
PIN 10	0	0	0	0	0	0	0	0
PIN 11	0	0	0	0	0	0	0	0
PIN 12	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
PIN 13	0	0	0	0	0	0	4.6	0
PIN 14	0	0	0	0	0	0	4.6	0
PIN 15	★	★	★	★	★	★	★	★
PIN 16	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

VOLTAGE MEASUREMENT:
1. CUE, REVIEW, FRAME ADVANCE.
COLOR BAR SIGNAL IN SLP MODE.
2. OTHERS
COLOR BAR SIGNAL IN SP MODE.

★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.

Q22	7-D
Q23	7-E
Q24	6-E
Q28	8-E
Q29	4-E
Q30	5-D
Q31	5-D
Q32	6-E
Q33	2-E


PIN NO.	IC 6001							
	STOP	FF	REW	REC	PLAY	CUE	REV	F-A
PIN 1	11.6	11.7	11.7	11.7	11.7	11.7	11.7	11.8
PIN 2	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
PIN 3	0.5	0.4	0.4	1.2	0.4	1.1	1.1	0.6
PIN 4	0	0	0	0	0	0	0	0
PIN 5	0	0	0	0	0	0	0	0
PIN 6	0	0	0	0	0	0	0	0
PIN 7	0.5	1.1	0.4	1.1	0.5	1.1	1.1	0.6
PIN 8	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7
PIN 9	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7

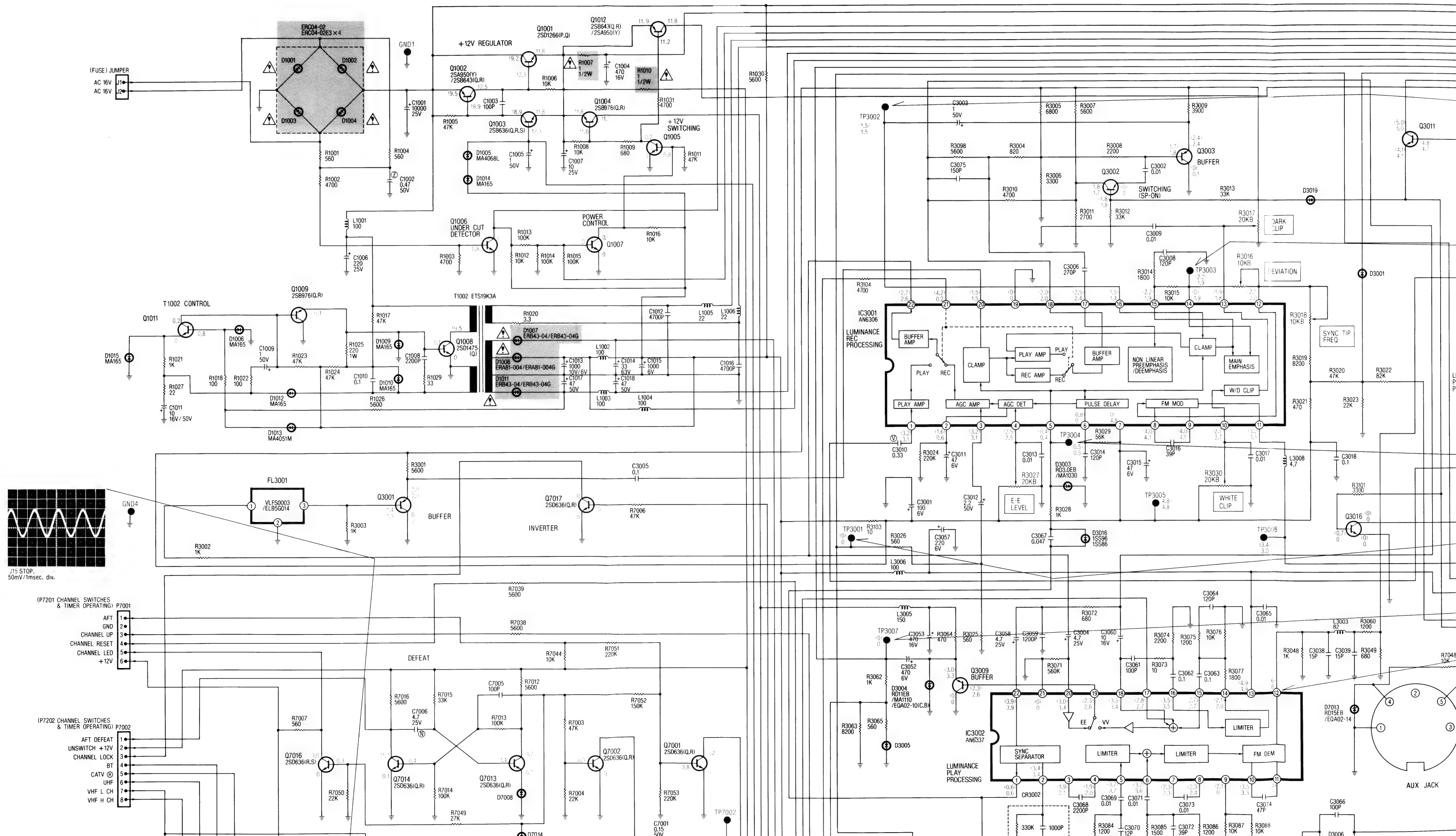
PIN NO.	IC 6003							
	STOP	FF	REW	REC	PLAY	CUE	REV	F-A
PIN 1	0	0	0	0	0	0	0	0
PIN 2	0.2	0.2	0.2	0	0.2	0.2	0	0
PIN 3	0	0	0	4.8	4.8	4.7	4.5	0
PIN 4	0	4.8	4.8	0	0	0	0	0
PIN 5	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0
PIN 6	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0
PIN 7	0.2	0.2	0.2	0.2	0.2	4.8	0.2	0
PIN 8	0	0	0	0	0	0	4.5	0
PIN 9	0	0	0.2	0	0.2	0.2	0	0
PIN 10	0	0	0	0	0	4.6	4.5	0
PIN 11	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0
PIN 12	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0
PIN 13	4.8	4.8	4.8	4.8	4.8	4.8	4.8	0
PIN 14	0.2	0.2	0.2	4.8	0.2	0.2	0.2	0
PIN 15	0	0.2	0.2	0.2	4.7	4.7	4.8	0
PIN 16	0.2	4.7	4.7	4.8	0.2	4.7	4.8	0
PIN 17	4.6	4.7	4.7	4.8	4.7	0.2	4.8	0
PIN 18	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0
PIN 19	0	0	0	0	0	0	0	0
PIN 20	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0
PIN 21	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0
PIN 22	4.9	4.8	4.8	4.8	4.9	0	4.9	0
PIN 23	4.8	4.9	4.9	4.8	4.9	0	4.8	0
PIN 24	0.2	0	0	0	0	4.8	0	0
PIN 25	4.9	4.9	4.8	4.8	4.8	0.2	0	0
PIN 26	0	0	0	0	0	0	0	0
PIN 27	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0
PIN 28	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0
PIN 29	4.3	4.3	4.3	4.3	4.3	4.3	4.3	0
PIN 30	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0
PIN 31	0.2	0.2	0.2	4.8	0.2	0.2	0.2	0
PIN 32	0.2	0.2	0.2	0.2	0.2	4.0	3.5	0
PIN 33	4.2	0.2	0.2	0.2	0.2	0.2	4.2	0
PIN 34	0.2	0.2	0.2	3.9	0.2	0.2	0.2	0
PIN 35	4.1	4.1	4.1	4.1	0.2	0.2	0.2	0
PIN 36	4.3	4.3	4.3	4.3	0.2	0.2	0	0
PIN 37	0.2	0.2	0.2	3.9	0.2	0.2	0.2	0
PIN 38	5.0	5.0	4.9	4.9	4.9	4.9	4.9	0
PIN 39	5.0	4.9	4.9	4.9	4.9	4.9	4.9	0
PIN 40	2.1	2.1	2.1	2.1	2.1	2.1	2.1	0

PIN NO.	IC 6002							
	STOP	FF	REW	REC	PLAY	CUE	REV	F·A
PIN 1	0	0	0	0	0	0	0	0
PIN 2	0	0	0	0	0	0	0	0
PIN 3	0	0	0	0	0	0	0	0
PIN 4	4.8	4.8	0	4.8	4.8	4.8	0.2	4.8
PIN 5	4.9	0	5.0	0	0	0	5.0	5.0
PIN 6	0	0	0	4.9	0	0	0	0
PIN 7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
PIN 8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
PIN 9	0	0	0	0	0	0	0	0
PIN 10	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
PIN 11	4.9	4.9	5.0	4.9	5.0	5.0	5.0	5.0
PIN 12	5.0	5.0	4.9	4.9	5.0	4.9	5.0	5.0
PIN 13	0.2	0.2	0.2	0.2	0.2	4.8	4.9	4.9
PIN 14	0	0	0	0	0	0	0	0
PIN 15	0.7	0.7	0.8	0.7	0.7	0.8	0.8	0.8
PIN 16	0	0	0	0	0	0	0	0
PIN 17	0	0	0	0	0	0	0	0
PIN 18	★	★	★	★	★	★	★	★
PIN 19	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 20	1.5	2.1	2.1	2.0	2.1	2.1	2.1	2.1
PIN 21	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
PIN 22	2.4	2.4	2.4	3.4	3.4	3.4	3.4	3.4
PIN 23	4.0	2.1	2.0	★	4.0	★	4.9	4.0
PIN 24	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
PIN 25	3.9	0	0	0.6	0.8	0.6	0.8	0.6
PIN 26	0	3.9	3.9	3.9	4.2	3.9	0.8	4.0
PIN 27	3.9	3.9	3.9	0.5	0.5	0.6	3.9	0.6
PIN 28	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
PIN 29	4.8	4.8	4.8	4.8	4.8	0	4.8	4.8
PIN 30	4.8	4.8	4.9	4.8	4.8	0	4.9	0
PIN 31	0	0	0	0	0	4.8	0	0
PIN 32	4.8	4.9	4.8	4.8	4.8	0	0	4.9
PIN 33	4.6	4.7	4.7	4.8	4.7	0.2	4.8	4.7
PIN 34	0.2	4.7	4.7	4.8	0.2	4.7	4.8	0.2
PIN 35	0.2	0.2	0.2	0.2	4.7	★	4.8	0.2
PIN 36	0.2	0.2	0.2	4.8	0.2	0.2	0.2	4.7
PIN 37	-27.7	-27.5	-27.3	-27.2	-27.5	-27.3	-27.3	-27.3
PIN 38	-27.5	-27.2	-27.2	-26.9	-27.2	-27.1	-27.2	-27.0
PIN 39	0	-27.5	-27.3	-27.1	-27.4	-27.3	-27.3	-27.3
PIN 40	-27.5	-27.5	-27.2	-27.1	-27.4	-27.2	-27.3	-27.2
PIN 41	-27.6	-27.5	-27.2	-27.1	-27.4	-27.2	-27.3	-27.2
PIN 42	-27.4	-27.2	-27.1	-26.9	-27.3	-27.1	-27.1	-27.1
PIN 43	-27.6	-27.4	-27.2	-27.1	-27.3	-27.3	-27.3	-27.2
PIN 44	-27.6	-27.5	-27.3	-27.1	-27.4	-27.3	-27.3	-27.2
PIN 45	-27.6	-27.5	-27.3	-27.1	-27.4	-27.3	-27.3	-27.2
PIN 46	-27.5	-27.2	-27.2	-26.9	-27.2	-27.1	-27.1	-27.0
PIN 47	-26.8	-26.3	-26.2	-26.1	-26.1	-26.0	-26.0	-25.9
PIN 48	0	-24.7	-24.5	-24.2	-24.5	-24.4	-24.5	-24.2
PIN 49	-25.0	-24.6	-24.4	-24.2	-24.4	-24.4	-24.5	-24.2
PIN 50	-26.0	-25.8	-25.6	-25.5	-25.7	-25.6	-25.6	-25.5
PIN 51	-25.8	-25.6	-25.5	-25.3	-25.7	-25.5	-25.5	-25.4
PIN 52	★	★	★	★	★	★	★	★
PIN 53	★	-26.2	★	★	★	★	★	-22.5
PIN 54	★	★	★	★	★	★	★	★
PIN 55	★	★	★	★	★	★	★	★
PIN 56	★	★	★	★	★	★	★	★
PIN 57	★	★	★	★	★	★	★	★
PIN 58	★	★	★	★	★	★	★	★
PIN 59	★	★	★	★	★	★	★	★
PIN 60	★	★	★	★	★	★	★	★
PIN 61	-28.4	-28.1	-27.6	-27.5	-27.5	-27.5	-27.5	-27.5
PIN 62	2.3	2.3	2.3	2.3	2.3	2.3	0	2.3
PIN 63	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
PIN 64	5.0	5.0	5.0	4.9	5.0	5.0	5.0	5.0

G

F**F**

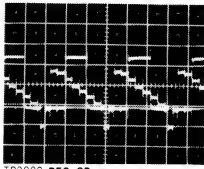
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.



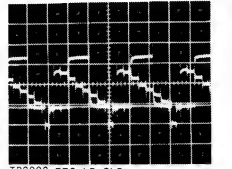
POWER SUPPLY & TUNER CONTROL SECTION
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN STOP MODE.

LUMINANCE & CHROMINANCE SECTION
VOLTAGE MEASUREMENT:
COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.
COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

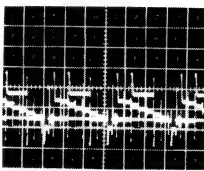
CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.



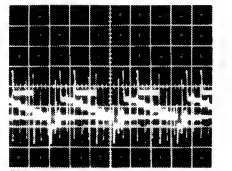
0.1V/20 μ sec. div.



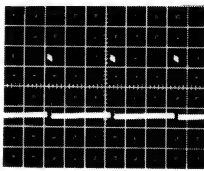
TP3002 REC. LP. SLP.
0.1V/20 μ sec. div.



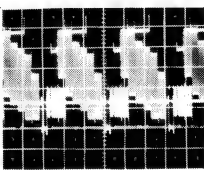
TP3003 REC. SP.
0.2V/20 μ sec.



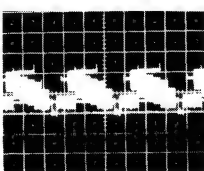
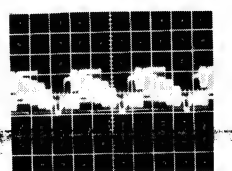
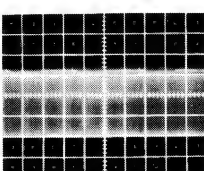
TP3003 REC. LP. SLP.
0.2V/20 μ sec.



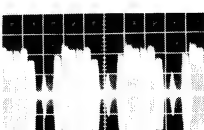
TP3004 REC.SP.LP.SLP
1V/20 μ sec. div.



TP3001 STOP.
0.2V/20 μ sec div

TP3007 REC.SP.LP.SLF
1V/20µsec/divTP3007 PLAY.SP.LP.SLP.
1V/10usec div

IC3002② PLAY. SP. LP.



E

D

C

B

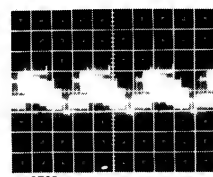
A

(P7201 CHANNEL SWITCHES
& TIMER OPERATING) P7001

AFT 1
GND 2
CHANNEL UP 3
CHANNEL RESET 4
CHANNEL LED +12V 5
+12V 6

(P7202 CHANNEL SWITCHES
& TIMER OPERATING) P7002

AFT DEFEAT 1
UNSWITCH +12V 2
CHANNEL LOCK 3
BT 4
CATV 5
UHF 6
VHF L CH 7
VHF H CH 8

J6 STOP
0.5V/20μsec. div.

(UHF/VHF TUNER)

BU
UHF/VHF AGC
BS
BV
BT
AFT
BM
IF

(TV DEMODULATOR)

UHF/VHF AGC J1
RF AGC J2
GND J3
IF J4
GND J5
VIDEO J6
+12V J7
GND J8
AUDIO J9
+12V J10
AFT SW J11
AUDIO J12
GND J13
AUDIO J14
AUDIO J15

(RF CONVERTER)

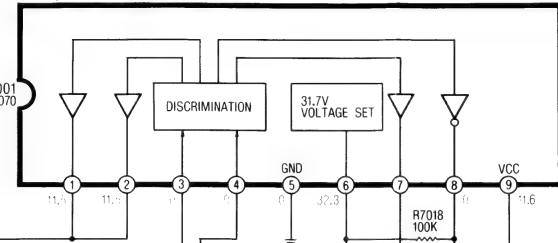
AUDIO
VIDEO
GND
+12V
RF CH

(ANTENNA TERMINAL) JUMPER

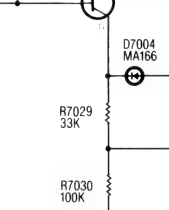
BS J3
+B J4

CH 4
CH 3
SW 7001
RF CH

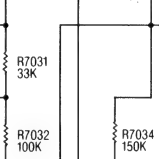
UHF/VHF TUNER POWER CONTROL



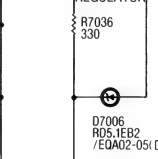
BAND DETECTOR



BT CONTROL



+45V REGULATOR

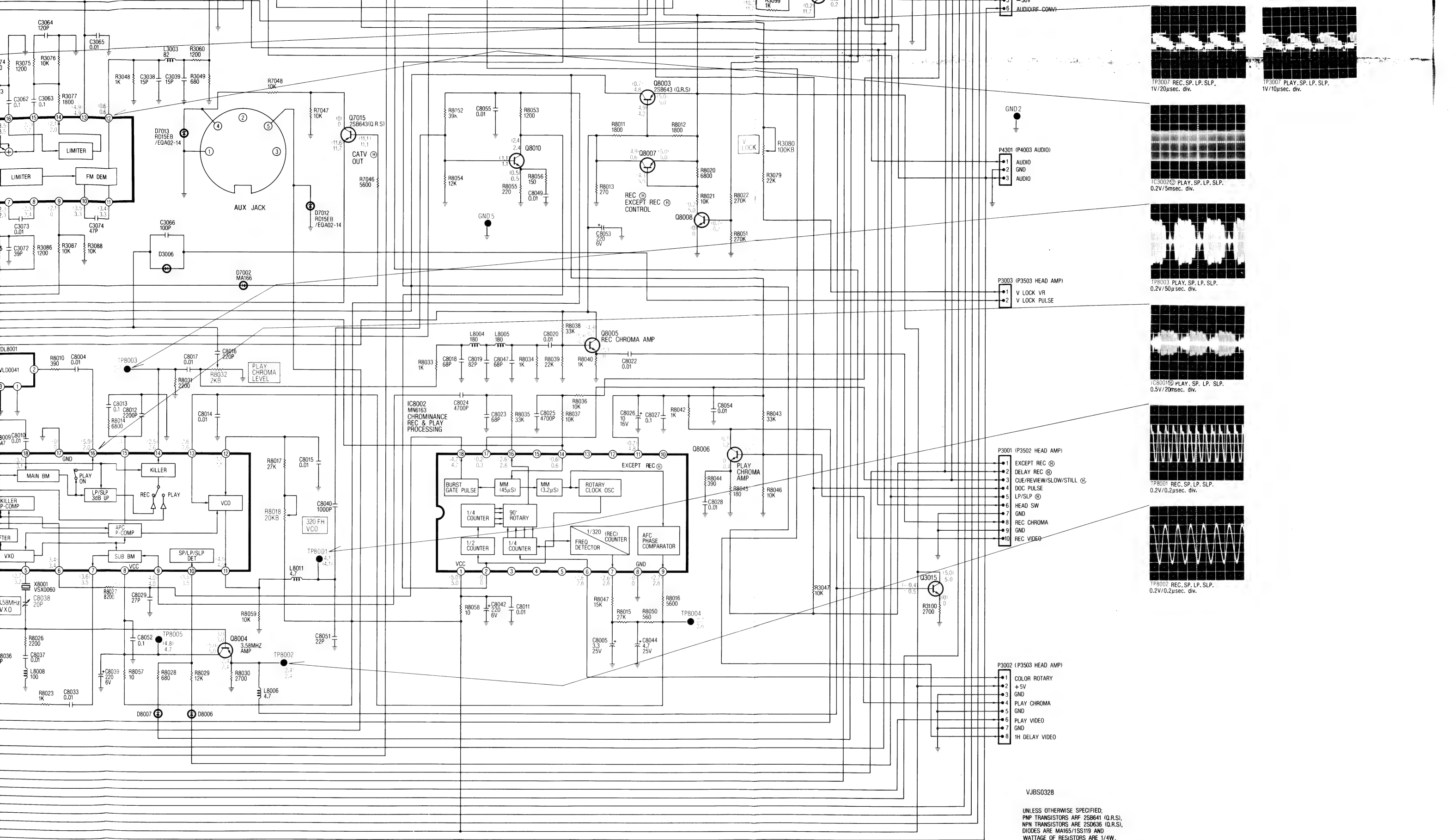


TUNER CONTROL SECTION

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A. R2, REF. NO. 7000 SERIES
SCHEMATIC DIAGRAM R7002
(R7002 IS ABBREVIATED TO R2)

POWER SUPPLY SECTION

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A. R2, REF. NO. 1000 SERIES
SCHEMATIC DIAGRAM R1002
(R1002 IS ABBREVIATED TO R2)




R SUPPLY SECTION
 REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE: C.B.A.---R2, REF. NO. 1000 SERIES
 SCHEMATIC DIAGRAM---R1002
 (R1002 IS ABBREVIATED TO R2)

LUMINANCE SECTION
 NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE: C.B.A.---R2, REF. NO. 3000 SERIES
 SCHEMATIC DIAGRAM---R3002
 (R3002 IS ABBREVIATED TO R2)


CHROMINANCE SECTION
 NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
 EXAMPLE: C.B.A.---R2, REF. NO. 8000 SERIES
 SCHEMATIC DIAGRAM---R8002
 (R8002 IS ABBREVIATED TO R2)

LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL C.B.A. VEPS0328A1

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.

POWER SUPPLY & TUNER
VOLTAGE MEASUREMENTS

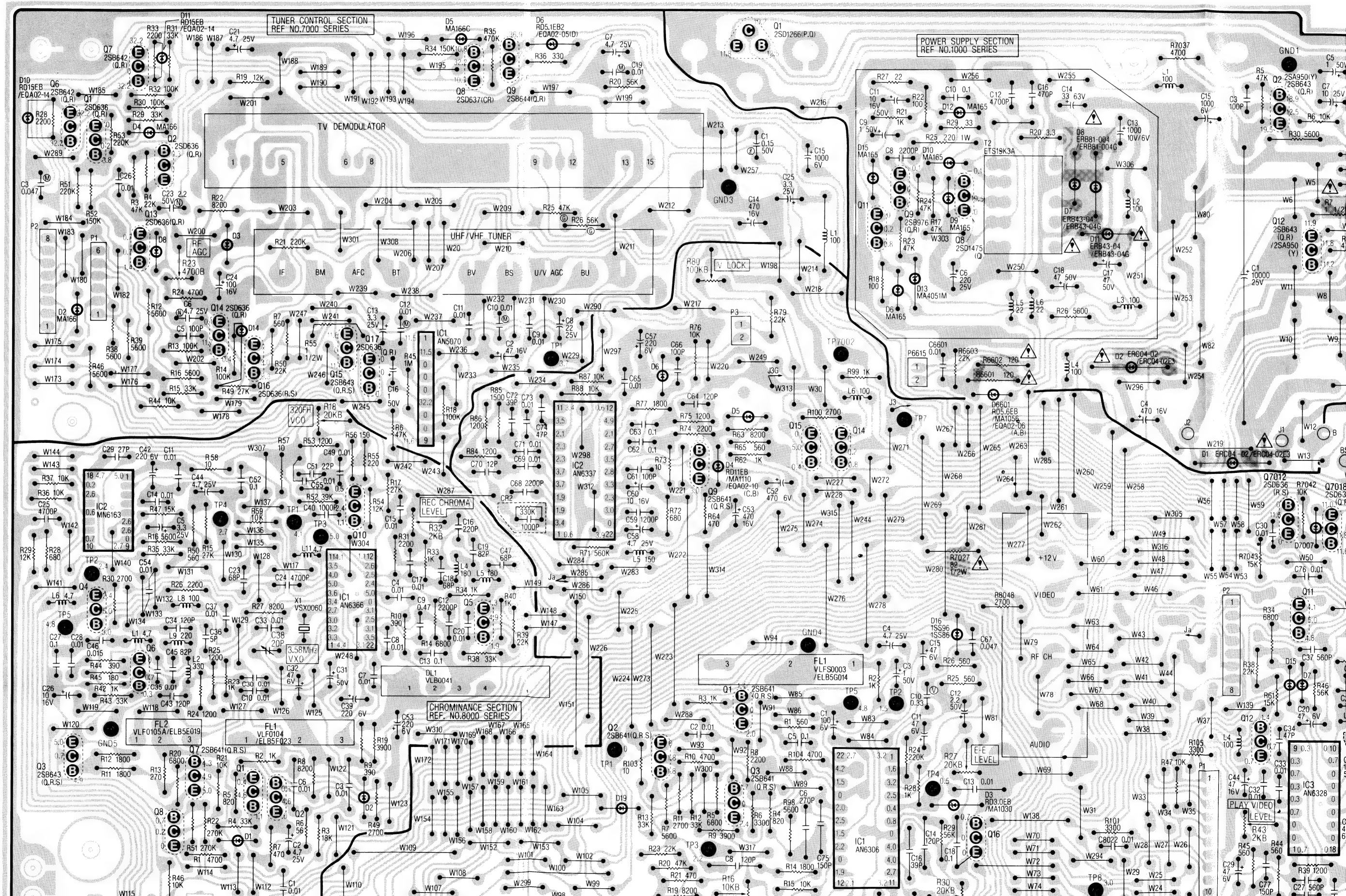
TV DEMODULATOR	
1	UHF/VHF AGC
2	RF AGC
3	GND
4	IF
5	GND
6	VIDEO
7	+12V
8	GND
9	AUDIO
10	+12V
11	AFT
12	AFT SW
13	AUDIO
14	GND
15	AUDIO

P7002	
1	AFT DEFEAT
2	UNSWITCH +12V
3	CHANNEL LOCK
4	BT
5	CATV 
6	UHF
7	VHF L CH
8	VHF H CH

P7001	
1	AFT
2	GND
3	CH UP
4	CH RESET
5	CHANNEL LED
6	+12V

P4301	
1	AUDIO
2	GND
3	AUDIO

P6615	
1	AC4.2V
2	AC4.2V



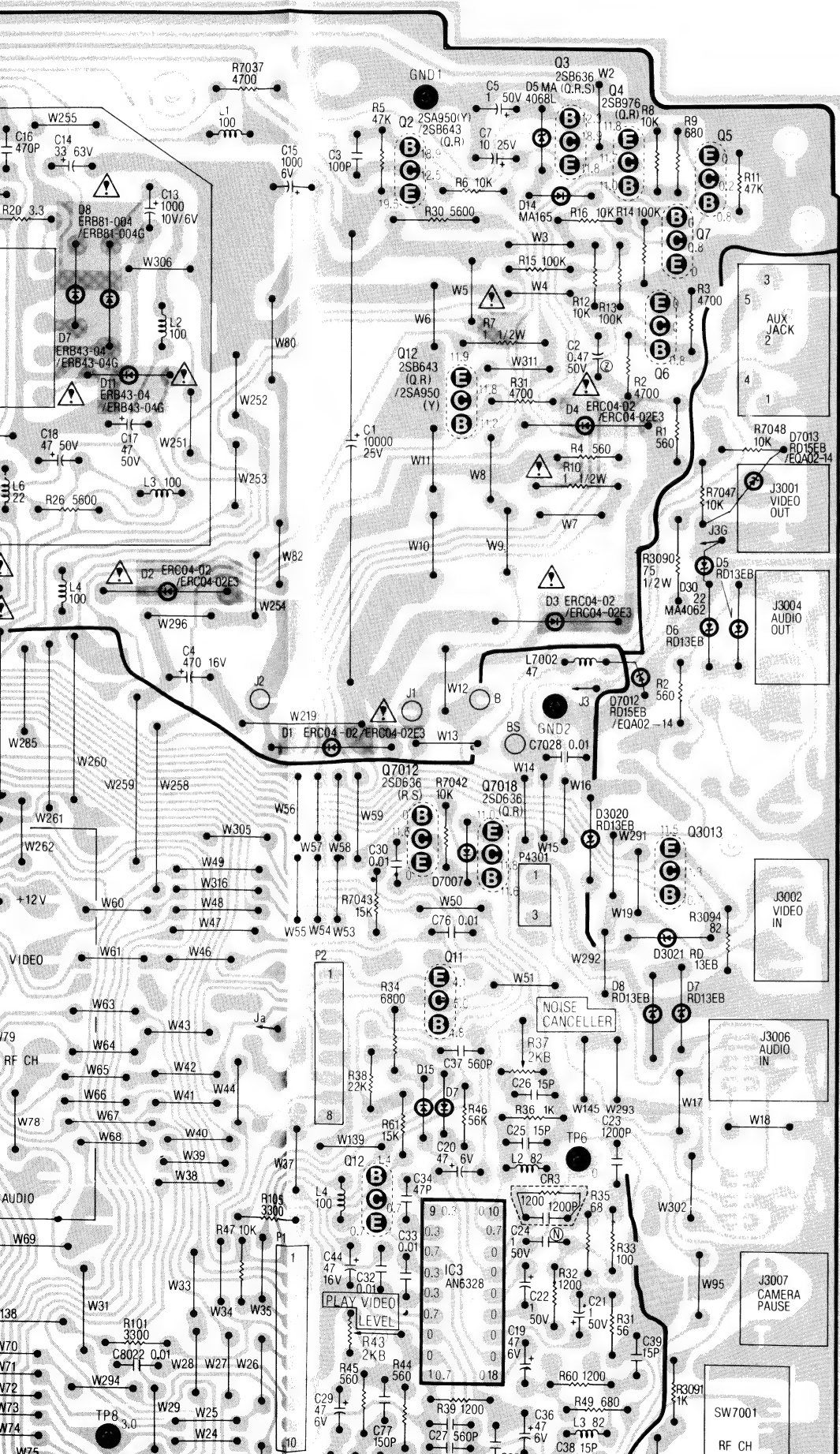
CE: THE SIGN ⚠ HAVE SPECIAL T FOR SAFETY. THESE COMPONENTS USE ONLY THE

POWER SUPPLY & TUNER CONTROL SECTION
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN STOP MODE

LUMINANCE & CHROMINANCE SECTION
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN SP REC MODE

LUMINANCE, CHROMINANCE,
POWER SUPPLY & TUNER
CONTROL C.B.A.

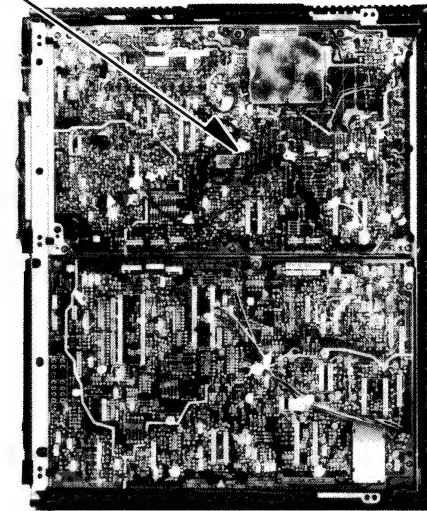
4-7
LUMINANCE, CHROMINANCE
POWER SUPPLY & TUNER
CONTROL C.B.A.



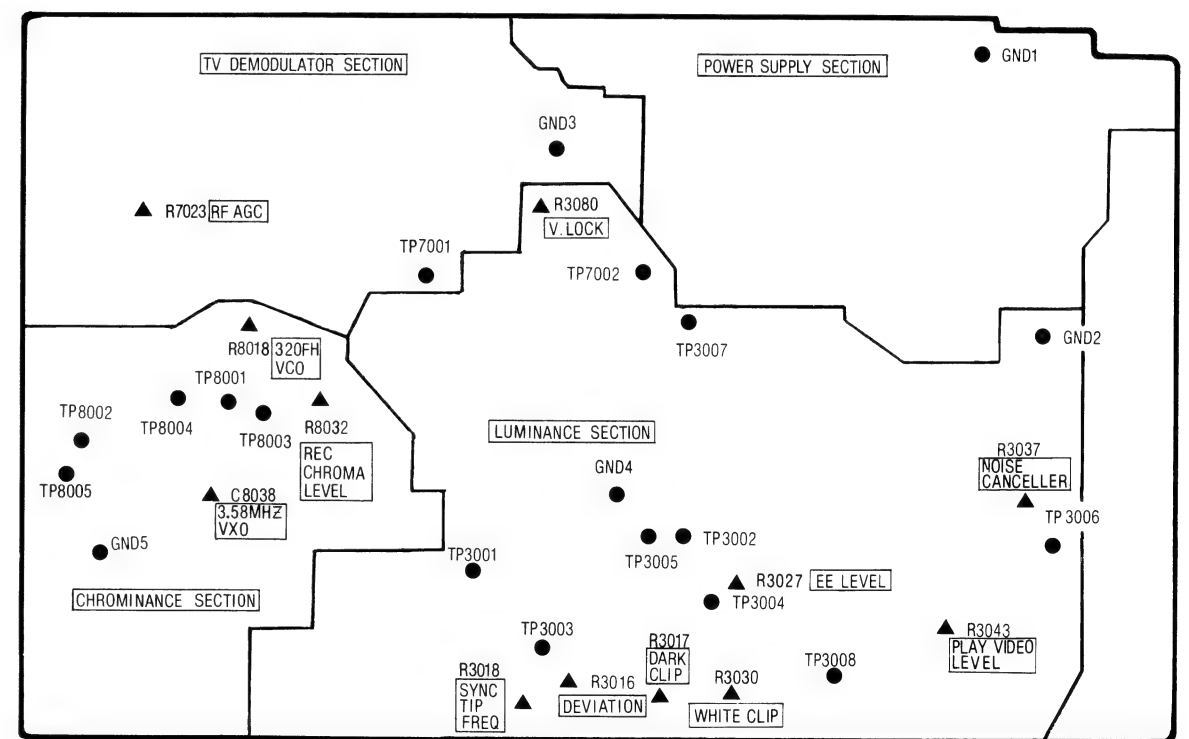
POWER SUPPLY SECTION	
Q 1	5-E
Q 2	7-E
Q 3	7-E
Q 4	8-E
Q 5	8-E
Q 6	8-E
Q 7	8-E
Q 8	6-E
Q 9	5-E
Q11	5-E
Q12	7-D

TUNER CONTROL SECTION	
Q 1	2-E
Q 2	2-E
Q 6	1-E
Q 7	2-E
Q 8	3-E
Q 9	3-E
Q12	7-C
Q13	2-E
Q14	2-D
Q15	3-D
Q16	2-D
Q17	3-D
Q18	7-C

LUMINANCE SECTION	
Q 1	5-B
Q 2	4-B
Q 3	5-B
Q 9	4-D
Q11	7-C
Q12	7-B
Q13	7-C
Q14	5-D
Q15	5-D
Q16	6-B



LOCATION OF TEST POINTS & ADJUSTMENT POINTS



PIN NO.	IC 8001				
	STOP	REC	PLAY	CUE	REV
PIN 1	3.1	4.4	3.1	3.1	3.1
PIN 2	3.0	3.3	3.2	3.2	3.2
PIN 3	3.2	3.2	3.2	3.2	3.2
PIN 4	3.0	3.0	3.0	2.9	3.0
PIN 5	3.2	2.7	3.2	3.2	3.2
PIN 6	3.4	3.4	3.4	3.4	3.4
PIN 7	3.6	3.6	3.5	3.5	3.6

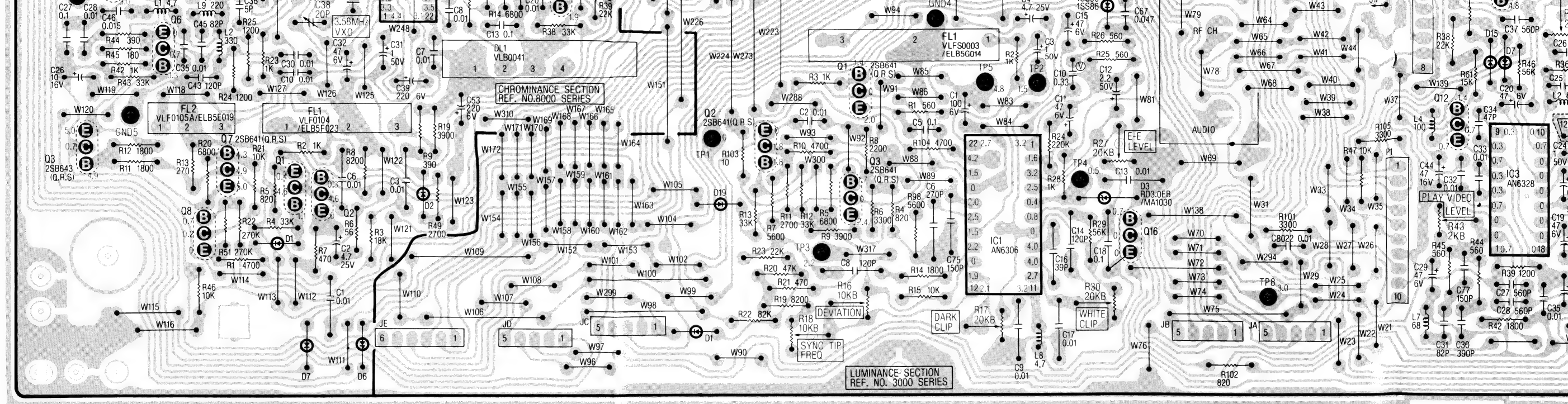
PIN NO.	IC 8002				
	STOP	REC	PLAY	CUE	REV
PIN 1	5.0	5.0	5.0	5.0	5.0
PIN 2	0	0	0	0	0
PIN 3	★	★	★	★	★
PIN 4	★	★	★	★	★
PIN 5	★	★	★	★	★
PIN 6	5.0	2.6	2.6	2.6	2.6
PIN 7	0	0	0	0	0

B

A

P4301
1 AUDIO
2 GND
3 AUDIO

P6615
1 AC4.2V
2 AC4.2V



P3001
1 EXCEPT REC (E)
2 DELAY REC (E)
3 CUE/REVIEW/SLOW/STILL (E)
4 DOC PULSE
5 LP/SLP (E)
6 HEAD SW
7 GND
8 REC CHROMA
9 GND
10 REC VIDEO

P3002
1 COLOR ROTARY
2 +5V
3 GND
4 PLAY CHROMA
5 GND
6 PLAY VIDEO
7 GND
8 1H DELAY VIDEO

P3003
1 V LOCK VR
2 V LOCK PULSE

JA
1 DELAY REC (E)
2 UNSWITCH +12V
3 UNDER CUT (E)
4 REC (E)
5 SLP (E)

JB
1 +12V
2 UNREG +18V
3 GND
4 GND(POWER)
5 +5V

JC
1 LP/SLP (E) (MONO)
2 CUE/REVIEW/SLOW/STILL (E)
3 EE/VV(EE) (E)
4 CAMERA PAUSE (E)
5 3.58MHz

JD
1 VSS
2 HEAD SW
3 PICTURE VR
4 PICTURE VR (GND)
5 CH LOCK

JE
1 CH UP
2 CH RESET
3 TV/VCR(TV) (E)
4 POWER ON (E)
5 -30V
6 AUDIO(IRF CONV)

JUMPER
J3 BS
J4 +B

(SCHEMATIC)

LUMINANCE SECTION	
Q3001	3-F
Q3002	7-H
Q3003	7-H
Q3009	6-E
Q3011	9-H
Q3012	11-F
Q3013	12-F
Q3014	12-F
Q3015	13-B
Q3016	8-F

CHROMINANCE SECTION	
Q8001	6-D
Q8002	7-D
Q8003	11-E
Q8004	9-B
Q8005	11-D
Q8006	12-C
Q8007	11-E
Q8008	11-D
Q8010	10-E

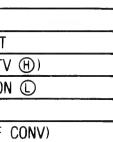
TUNER CONTROL SECTION	
Q7001	5-E
Q7002	4-E
Q7006	3-B
Q7007	4-B
Q7008	4-B
Q7009	4-B
Q7012	6-B
Q7013	4-E
Q7014	3-E
Q7015	9-E
Q7016	2-E
Q7017	4-F
Q7018	5-B

POWER SUPPLY SECTION	
Q1001	4-H
Q1002	3-H
Q1003	4-H
Q1004	4-H
Q1005	4-H
Q1006	3-H
Q1007	4-H
Q1008	3-G
Q1009	2-G
Q1011	2-G
Q1012	4-H

	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q3001	2.0	1.3	0	2.0	1.4	0	2.0	1.3	0	2.0	1.3	0	2.0	1.3	0
Q3002	0	1.8	1.8	0	1.8	1.8	0	1.8	1.7	0	1.9	1.8	0	1.8	1.8
Q3003	2.4	1.8	0	2.4	1.7	0	2.4	1.8	0.1	2.4	1.8	0	2.4	1.8	0
Q3009	3.0	2.3	0	3.0	2.3	0	3.3	2.6	0	3.3	2.6	0	3.3	2.6	0
Q3011	4.1	4.8	5.0	4.1	4.8	5.0	4.1	4.7	5.0	4.1	4.8	5.0	4.1	4.8	5.1
Q3012	4.6	5.4	4.7	0.7	1.4	0.7	4.6	5.3	4.7	4.6	5.3	4.7	4.6	5.4	4.7
Q3013	11.5	10.7	11.3	11.5	10.7	11.3	11.8	11.7	0	11.8	11.7	0	11.7	11.7	0
Q3014	0	0.8	0.2	0	0.8	0.2	0	0.2	11.7	0	0.2	11.7	0	0.2	11.7
Q3015	0	-0.4	5.0	0	-0.4	5.0	0	-0.5	5.0	0	-0.6	5.0	0	-0.6	5.0
Q3016	0	0	0	0	0.7	0	0	0	0	0	0	0	0	0	0

	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q8001	0	0.4	3.7	0.4	1.1	4.6	0	0.5	3.7	0	0.5	3.7	0	0.5	3.7
Q8002	0.7	1.5	3.6	0	0.3	4.6	0.8	1.5	3.7	0.8	3.7	1.5	0.8	1.5	3.7
Q8003	5.0	4.2	4.8	5.0	4.9	0.7	5.0	4.2	4.8	5.0	4.2	4.8	5.0	4.2	4.8
Q8004	2.4	3.0	5.0	2.4	3.0	5.0	2.4	3.0	5.0	2.4	3.0	5.0	2.4	3.0	5.0
Q8005	0	0.3	0.6	1.3	1.9	4.9	0	0.3	0.7	0	0.3	0.7	0	0.3	0.7
Q8006	0.4	1.1	3.2	0	0.3	0.7	0.4	1.1	3.2	0.4	1.1	3.2	0.4	1.1	3.2
Q8007	5.0	5.0	0.6	5.0	4.3	4.9	5.0	5.0	0.6	5.0	5.0	0.6	5.0	5.0	0.6
Q8008	0	0	5.0	0	0.7	0.2	0	0.2	5.0	0	0.2	5.0	0	0.2	5.0
Q8010	0.5	1.1	2.4	0.5	1.1	2.4	0.5	1.1	2.4	0.5	1.1	2.4	0.5	1.1	2.4

PIN NO.	IC 3001				
	STOP	REC	PLAY	CUE	REV
PIN 1	3.2	3.2	3.1	3.1	3.1
PIN 2	1.6	1.6	0.6	0.7	0.7
PIN 3	3.1	3.2	3.1	3.1	3.2
PIN 4	2.5	2.5	2.5	2.5	2.5
PIN 5	0.4	0.4	0.4	0.5	0.4
PIN 6	0.8	0.8	0	0.9	0.8
PIN 7	4.9	0	4.8	4.8	4.8
PIN 8	4.0	4.0	4.1	4.1	4.1
PIN 9	4.0	4.0	4.1	4.1	4.1
PIN 10	2.7	2.7	2.7	2.7	2.7
PIN 11	3.2	3.2	3.5	3.6	3.6
PIN 12	2.0	2.1	2.0	2.0	2.0
PIN 13	1.9	1.9	1.8	1.8	1.8
PIN 14	2.2	0	1.9	1.9	1.9
PIN 15	2.2	2.2	1.9	1.9	1.9
PIN 16	1.5	1.5	1.4	1.4	1.5
PIN 17	2.5	2.5	2.4	2.5	2.4
PIN 18	2.1	2.0	2.0	2.0	2.1
PIN 19	0	0	0	0	0
PIN 20	1.5	1.5	1.5	1.5	1.6
PIN 21	4.1	4.2	0.2	0.2	0.2
PIN 22	2.7	2.7	2.6	2.7	2.7



J3	BS
J4	+B

8

Q 1	5-B
Q 2	4-B
Q 3	5-B
Q 9	4-D
Q11	7-C
Q12	7-B
Q13	7-C
Q14	5-D
Q15	5-D
Q16	6-B

Q 1	2-B
Q 2	2-B
Q 3	1-B
Q 4	2-C
Q 5	3-C
Q 6	2-C
Q 7	2-B
Q 8	2-B
Q10	3-C

PIN NO.	IC 8002				
	STOP	REC	PLAY	CUE	REV
PIN 1	5.0	5.0	5.0	5.0	5.0
PIN 2	0	0	0	0	0
PIN 3	★	★	★	★	★
PIN 4	★	★	★	★	★
PIN 5	★	★	★	★	★
PIN 6	5.0	2.6	2.6	2.6	2.6
PIN 7	2.6	2.6	2.6	2.6	2.6
PIN 8	0	0	0	0	0
PIN 9	2.6	2.7	2.6	2.7	2.6
PIN 10	★	★	★	★	★
PIN 11	4.8	0.7	4.8	4.8	4.8
PIN 12	★	★	★	★	★
PIN 13	★	★	★	★	★
PIN 14	0.6	0.6	0.6	0.6	0.6
PIN 15	4.9	5.0	5.0	5.0	5.0
PIN 16	2.6	2.6	2.6	2.6	2.6
PIN 17	0.2	0.2	0.3	4.0	3.5
PIN 18	4.7	4.7	4.7	4.7	4.7

PIN NO.	C 3002				
	STOP	REC	PLAY	CUE	REV
PIN 1	0.7	0.6	0.6	0.6	0.6
PIN 2	3.4	3.4	3.4	3.4	3.3
PIN 3	2.0	1.9	2.1	2.1	2.1
PIN 4	1.9	1.9	2.0	2.0	2.0
PIN 5	3.7	3.7	3.7	3.7	3.5
PIN 6	3.7	3.7	3.6	3.7	3.7
PIN 7	2.4	2.3	2.3	2.4	0
PIN 8	2.4	2.3	2.4	2.4	2.4
PIN 9	2.1	2.1	0	0	0
PIN 10	3.4	3.5	3.3	3.4	3.3
PIN 11	3.4	3.4	3.3	3.3	3.4
PIN 12	0.6	0.6	0.6	0.6	0.6
PIN 13	4.9	4.9	4.9	4.9	4.9
PIN 14	2.1	2.1	2.0	2.1	2.1
PIN 15	2.7	2.7	2.7	2.7	2.7
PIN 16	3.5	3.5	3.5	3.5	3.5
PIN 17	2.7	2.8	2.7	2.7	2.7
PIN 18	3.3	3.3	3.4	3.4	3.4
PIN 19	2.3	2.3	2.6	2.6	2.6
PIN 20	3.0	3.0	3.4	3.4	3.4
PIN 21	0	0	0	0	0
PIN 22	3.9	3.9	3.9	3.9	3.9

TP NO.	STOP	REC	PLAY	CUE	REV
TP8001	4.1	4.1	4.1	4.1	4.1
TP8002	2.4	2.4	2.4	2.4	2.4
TP8003	5.0	5.0	5.0	5.0	5.0
TP8004	2.6	2.7	2.6	2.7	2.6
TP8005	4.7	4.8	4.7	4.7	4.7

TP NO.	STOP	REC	PLAY	CUE	REV
TP3001	0	0	0	0	0
TP3002	1.5	1.5	1.5	1.5	1.5
TP3003	2.2	2.2	1.9	1.9	1.9
TP3004	0.5	0.5	0.5	0.5	0.5
TP3005	4.8	4.8	4.8	4.8	4.8
TP3006	3.2	0	3.2	3.2	3.2
TP3007	0	0	0	0	0
TP3008	3.0	3.0	3.4	3.4	3.4

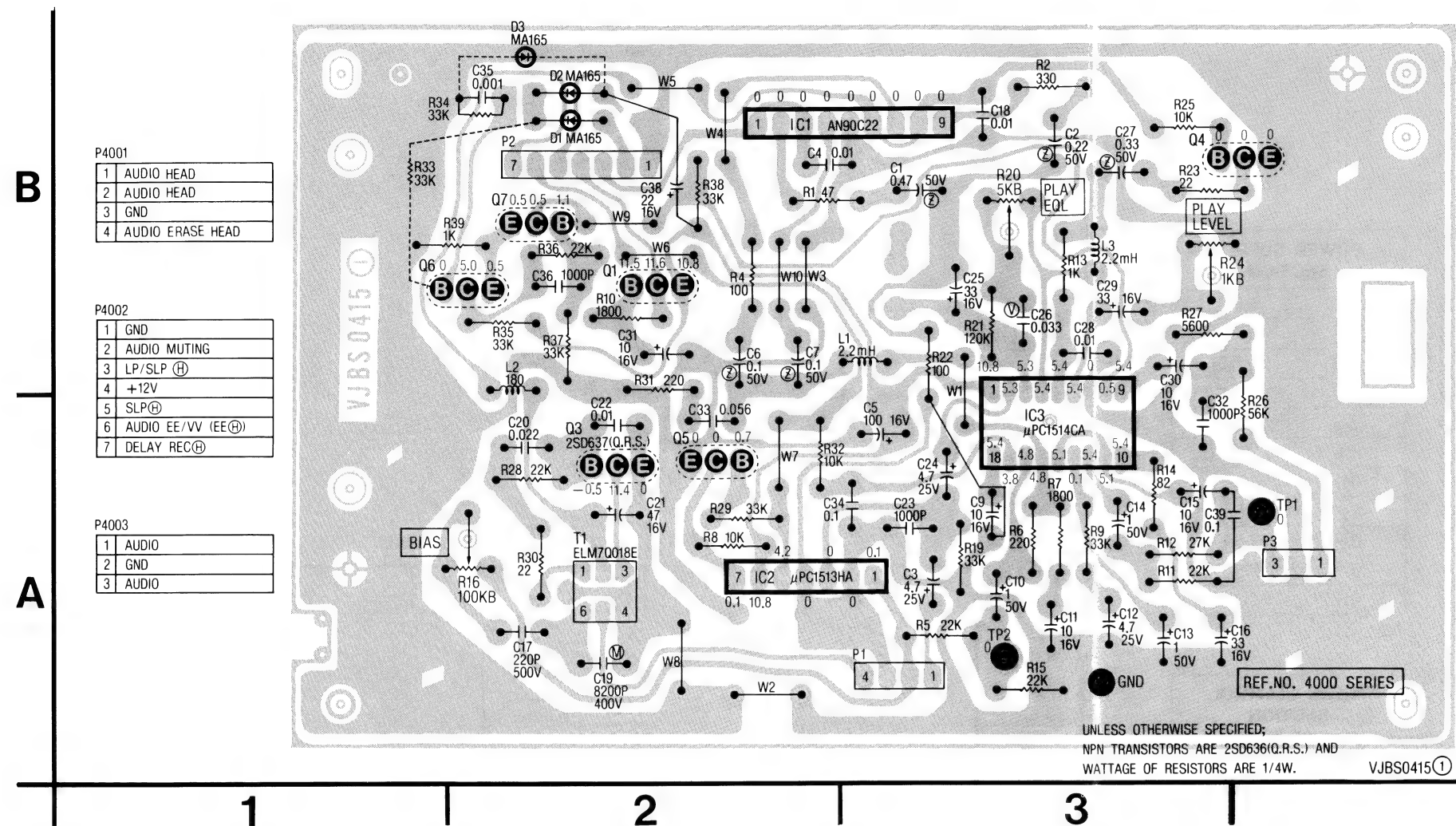
★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.

AUDIO C.B.A. VEPS0415A

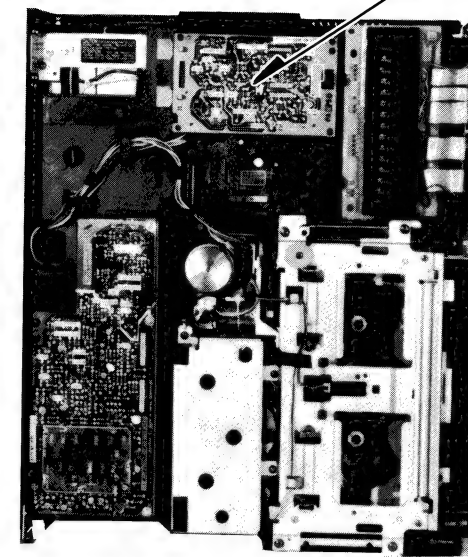
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN SP REC MODE.

AUDIO C.B.A.

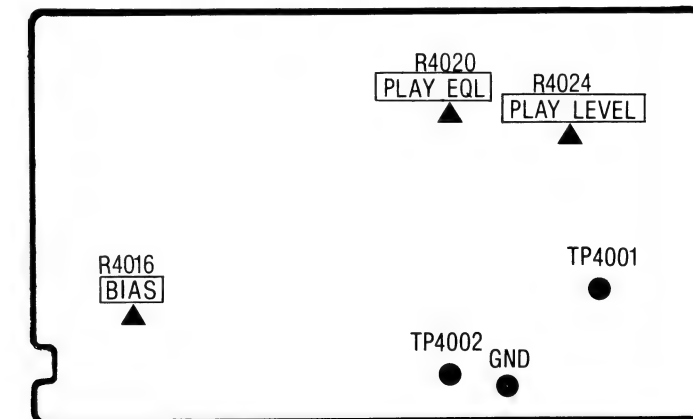
HEAD AMP C.B.A



AUDIO SECTION	
Q1	2-B
Q3	2-A
Q4	3-B
Q5	2-A
Q6	2-B
Q7	2-B



LOCATION OF TEST POINTS & ADJUSTMENT POINTS



P3501	
1	GND
2	VIDEO HEAD SP R CH
3	VIDEO HEAD SP R CH
4	VIDEO HEAD LP/SLP L CH
5	VIDEO HEAD LP/SLP L CH
6	VIDEO HEAD LP/SLP R CH
7	VIDEO HEAD LP/SLP R CH
8	VIDEO HEAD SP R CH
9	VIDEO HEAD SP R CH
10	GND

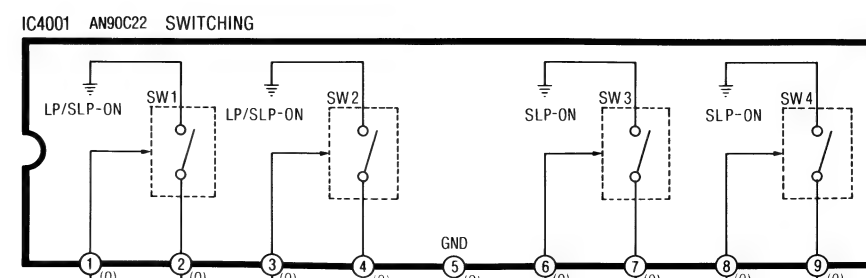
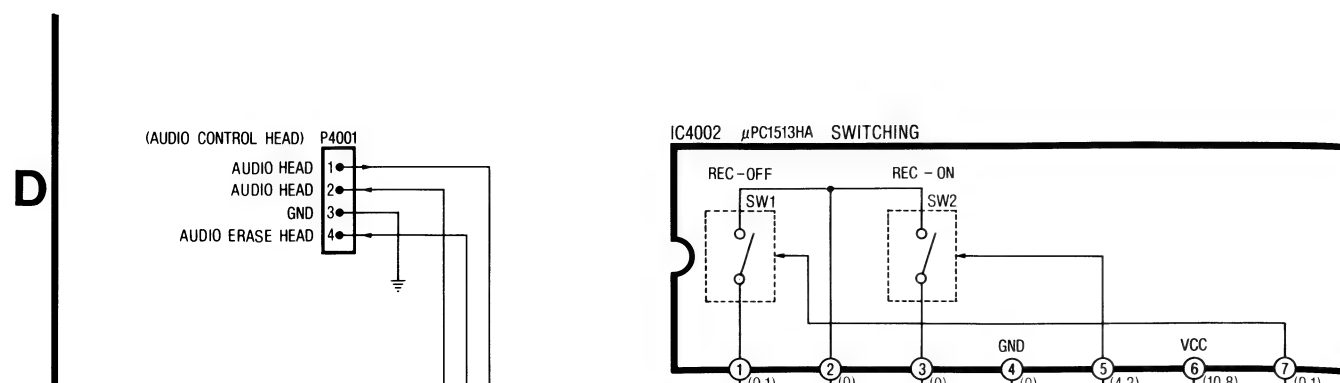
1	DELAY REC (H)
2	CUE/REVIEW/SLOW/STILL (H)
3	LP/SLP (H)
4	REC VIDEO
5	REC CHROMA
6	GND
7	GND
8	DOC PULSE
9	HEAD SW
10	EXCEPT REC (H)

P3503	
1	PLAY CHROMA
2	IH DELAY VIDEO
3	GND
4	PLAY VIDEO
5	GND
6	+ 5V
7	GND
8	COLOR ROTARY
9	V LOCK VR
10	V LOCK PULSE

1	STOP/SLOW/STILL (L)
2	HEAD SW C
3	REC (H)
4	HEAD SW B
5	HEAD SW A

AUDIO SCHEMATIC DIAGRAM

VOLTAGE MEASUREMENT:
 COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.
 COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

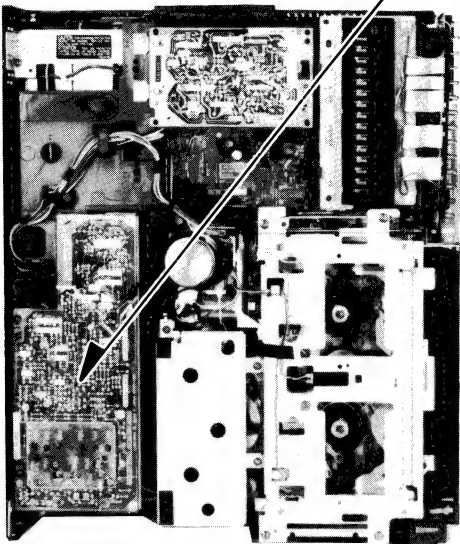


CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

HEAD AMP C.B.A. VEPS0504A

VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN SP REC MODE.

HEAD AMP C.B.A.



P3501

1	GND
2	VIDEO HEAD SP R CH
3	VIDEO HEAD SP R CH
4	VIDEO HEAD LP/SLP L CH
5	VIDEO HEAD LP/SLP L CH
6	VIDEO HEAD LP/SLP R CH
7	VIDEO HEAD LP/SLP R CH
8	VIDEO HEAD SP R CH
9	VIDEO HEAD SP R CH
10	GND

P3502

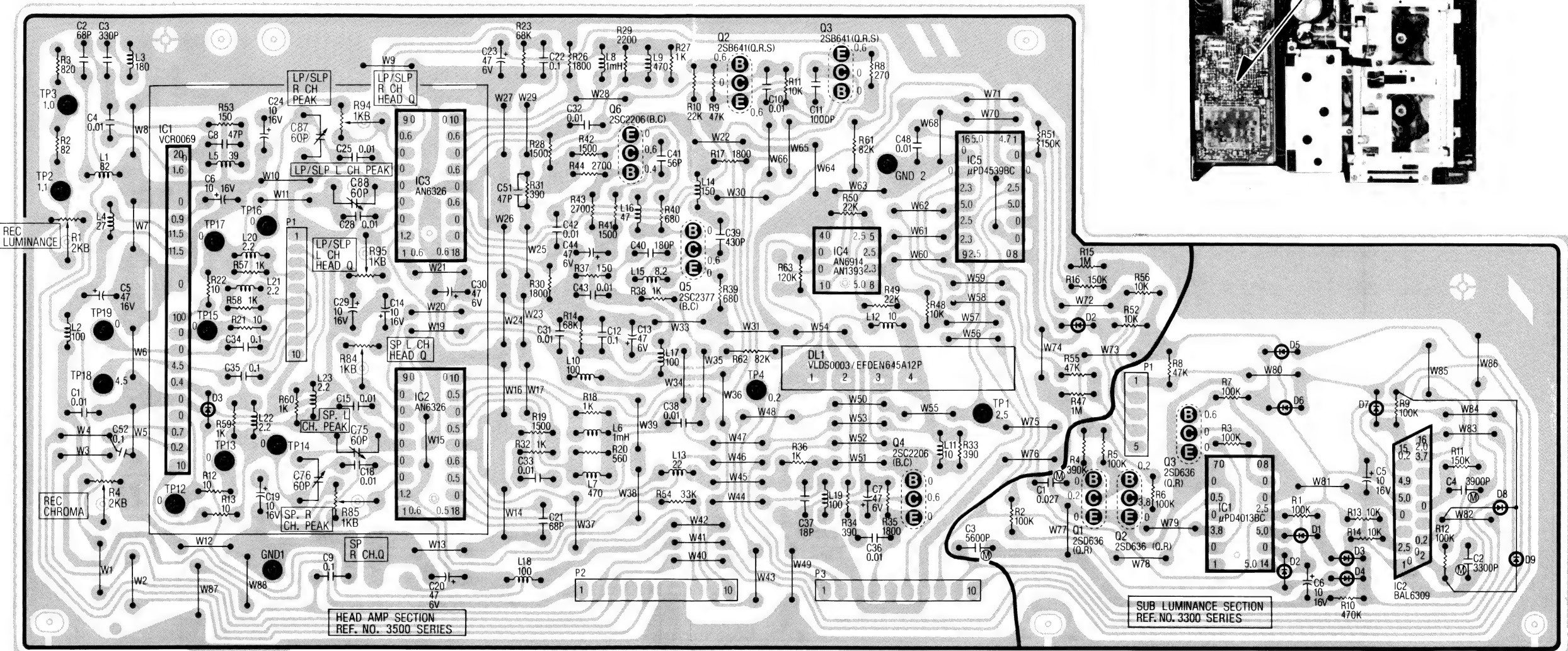
1	DELAY REC (H)
2	CUE/REVIEW/SLOW/STILL (H)
3	LP/SLP (H)
4	REC VIDEO
5	REC CHROMA
6	GND
7	GND
8	DOC PULSE
9	HEAD SW
10	EXCEPT REC (H)

P3503

1	PLAY CHROMA
2	IH DELAY VIDEO
3	GND
4	PLAY VIDEO
5	GND
6	+5V
7	GND
8	COLOR ROTARY
9	V LOCK VR
10	V LOCK PULSE

P3301

1	STOP/SLOW/STILL (H)
2	HEAD SW C
3	REC (H)
4	HEAD SW B
5	HEAD SW A



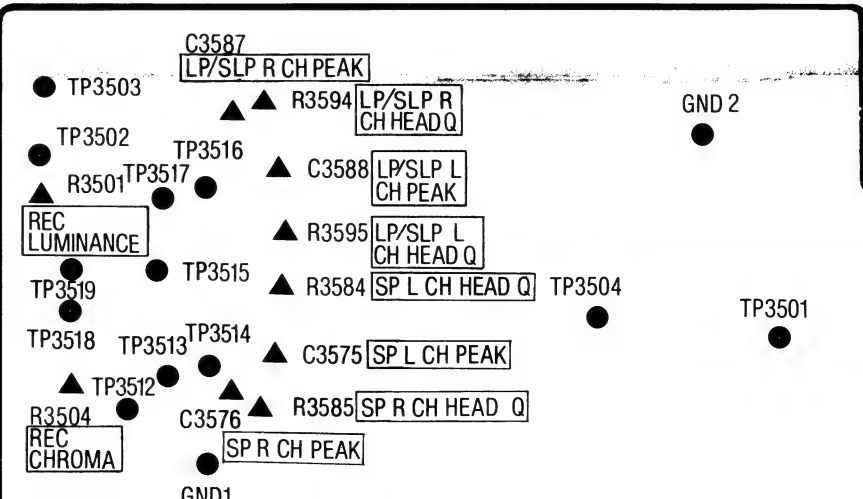
UNLESS OTHERWISE SPECIFIED:
DIODES ARE MA165/1SS119 AND
WATTAGE OF RESISTORS ARE 1/4W. VJBS0504

CALLOUTS NEXT TO WIRING PLUGS INDICATE
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

HEAD AMP SECTION	
Q2	4-B
Q3	4-B
Q4	4-A
Q5	4-B
Q6	3-B

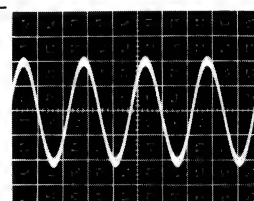
SUB LUMINANCE SECTION	
Q1	5-A
Q2	5-A
Q3	5-A

LOCATION OF TEST POINTS & ADJUSTMENT POINTS



A

CALLOUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.



AUDIO SECTION	
Q4001	3-B
Q4003	3-C
Q4004	5-A
Q4005	3-B
Q4006	2-A
Q4007	3-A

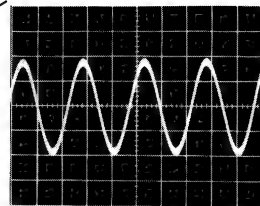
UNLESS OTHERWISE SPECIFIED;
NPN TRANSISTORS ARE 2SD636(Q.R.S.) AND
WATTAGE OF RESISTORS ARE 1/4W. VJBS0415

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A. ...R2, REF. NO. 4000 SERIES
SCHEMATIC DIAGRAM...R4002
(R4002 IS ABBREVIATED TO R2)

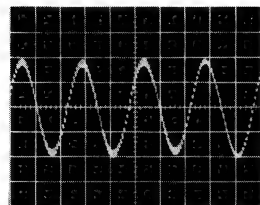
ALL OUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

03 (P4301 LUMINANCE CHROMINANCE, POWER SUPPLY & TUNER CONTROL)

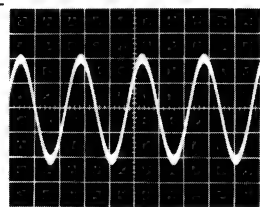
AUDIO
GND
AUDIO



TP4001 REC. SP. LP. SLP.
0.2V/1msec. div.



TP4001 PL AY. SP. LP. SLP.
0.2V/1msec. div.



TP4002 REC. SP. LP. SLP.
0.2V/1msec. div.

AUDIO SECTION

Q4001	3-B
Q4003	3-C
Q4004	5-A
Q4005	3-B
Q4006	2-A
Q4007	3-A

HEAD AMP SECTION	
Q2	4-B
Q3	4-B
Q4	4-A
Q5	4-B
Q6	3-B

SUB LUMINANCE SECTION	
Q1	5-A
Q2	5-A
Q3	5-A

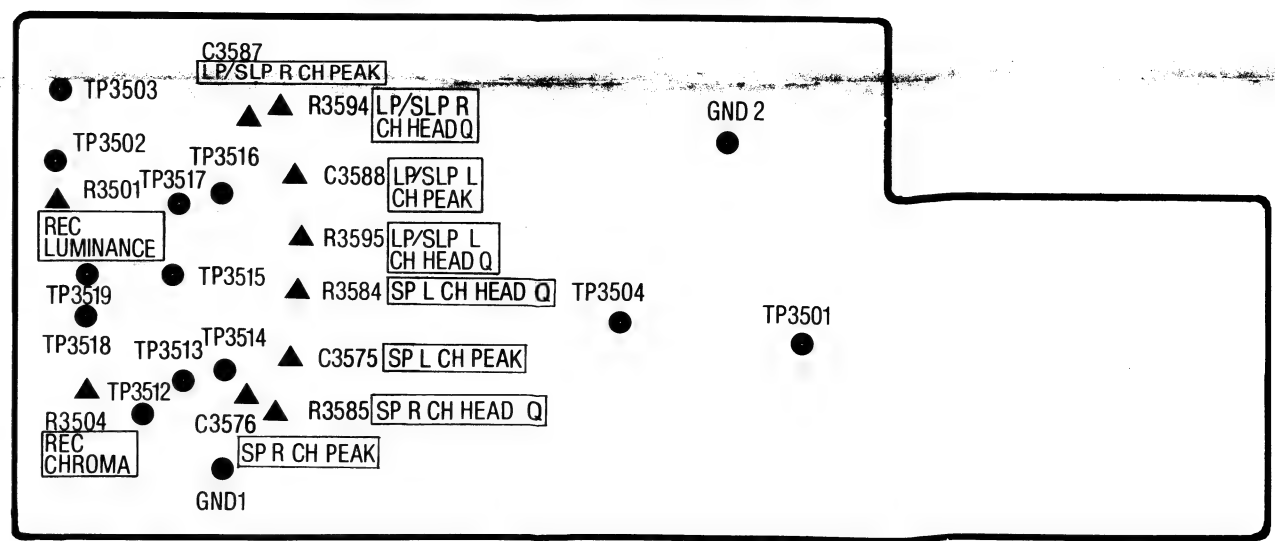
PIN NO.	IC 4001		
	STOP	REC	PLAY
PIN 1	0	0	0
PIN 2	0	0	0
PIN 3	0	0	0
PIN 4	0	0	0
PIN 5	0	0	0
PIN 6	0	0	0
PIN 7	0	0	0
PIN 8	0	0	0
PIN 9	0	0	0

PIN NO.	IC 4002		
	STOP	REC	PLAY
PIN 1	0	0.1	0
PIN 2	0	0	0.1
PIN 3	0	0	0
PIN 4	0	0	0
PIN 5	4.3	4.2	0.1
PIN 6	10.8	10.8	10.9
PIN 7	0.1	0.1	10.2

TP NO.	STOP	REC	PLAY
TP4001	0	0	0
TP4002	0	0	0

	STOP			REC			PLAY		
	E	B	C	E	B	C	E	B	C
Q4001	10.8	11.5	11.7	10.8	11.5	11.6	10.9	11.6	11.7
Q4003	0	0.4	0.4	0	-0.5	11.4	0	0.4	0.4
Q4004	0	0	0	0	0	0	0	0	0
Q4005	0	0.7	0	0	0.7	0	0	0.2	10.2
Q4006	0.5	0	5.0	0.5	0	5.0	0.5	0	5.0
Q4007	0.5	1.2	0.5	0.5	1.1	0.5	0.5	1.2	0.5

LOCATION OF TEST POINTS & ADJUSTMENT POINTS



PIN NO.	IC 4003		
	STOP	REC	PLAY
PIN 1	10.8	10.8	10.9
PIN 2	5.3	5.3	5.3
PIN 3	5.3	5.3	5.3
PIN 4	5.4	5.4	5.4
PIN 5	5.4	5.4	5.4
PIN 6	5.4	5.4	5.4
PIN 7	0	0	0
PIN 8	0.5	0.5	0.5
PIN 9	5.4	5.4	5.4
PIN 10	5.4	5.4	5.4
PIN 11	5.1	5.1	5.1
PIN 12	5.4	5.4	5.4
PIN 13	0.4	0.1	0
PIN 14	5.1	5.1	5.1
PIN 15	4.8	4.8	5.1
PIN 16	4.8	4.8	5.1
PIN 17	3.9	3.8	0.2
PIN 18	5.4	5.4	5.5

PIN NO.	IC 3301				
	STOP	REC	PLAY	CUE	REV
PIN 1	★	★	★	★	★
PIN 2	0	0	0	0	0
PIN 3	5.0	3.8	3.8	3.8	3.8
PIN 4	0	0	0	0	0
PIN 5	0	0.5	2.6	2.7	2.7
PIN 6	0	0	0	0	0
PIN 7	0	0	0	0	0
PIN 8	0	0	0	0	0
PIN 9	0	0	0	0	0
PIN 10	0	0	0	0	0
PIN 11	4.9	2.5	2.5	2.5	2.5
PIN 12	5.0	5.0	5.0	5.0	5.0
PIN 13	0	0	0	0	0
PIN 14	5.0	5.0	5.0	5.0	5.0

PIN NO.	IC 3302				
	STOP	REC	PLAY	CUE	REV
PIN 1	0	0	0	0	0
PIN 2	0	0	0	0	0.2
PIN 3	2.5	2.5	2.5	2.5	2.5
PIN 4	0.3	0.2	0.3	0.3	0.3
PIN 5	★	★	★	★	★
PIN 6	★	★	★	★	★
PIN 7	0	0	0	0	0
PIN 8	0	0	0	0	0
PIN 9	5.0	5.0	5.0	5.0	5.0
PIN 10	★	★	★	★	★
PIN 11	5.0	4.9	4.9	4.8	4.8
PIN 12	★	★	★	★	★
PIN 13	★	★	★	★	★
PIN 14	0	3.7	4.1	4.1	3.7
PIN 15	0.2	0.2	0.2	3.8	3.4
PIN 16	3.7	2.0	2.0	2.0	2.0

- VOLTAGE MEASUREMENTS:
1. CUE, REVIEW, COLOR BAR SIGNAL IN SLP MODE.
 2. OTHERS, COLOR BAR SIGNAL IN SP MODE.
- ★ : UNMEASURABLE OR UNNECESSARY TO MEASURE.

ARE SPECIFIED;
ARE 2SD636(Q.R.S.) AND
STORS ARE 1/4W.

VJBS0415

NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A.---R2, REF. NO. 4000 SERIES
SCHEMATIC DIAGRAM---R4002
(R4002 IS ABBREVIATED TO R2)

PIN NO.	IC 3501				
	STOP	REC	PLAY	CUE	REV
PIN 1	0	0	0	0	0
PIN 2	0.2	0.2	0.2	4.0	3.5
PIN 3	0	0.7	0	0	0
PIN 4	0	0	0	0	0
PIN 5	0	0	0	0	0
PIN 6	4.0	0.4	4.0	4.0	4.0
PIN 7	0	4.5	0	0	0
PIN 8	0	0	0	0	0
PIN 9	0	0	0	0	0
PIN 10	0	0	0	0	0
PIN 11	★	★	★	★	★
PIN 12	0	0	0	0	0
PIN 13	★	★	★	★	★
PIN 14	0	11.5	0	0	0
PIN 15	0	11.5	0	0	0
PIN 16	0	0.9	0	0	0
PIN 17	0	0	0	0	0
PIN 18	★	★	★	★	★
PIN 19	0	1.6	0	0	0
PIN 20	0	0	0	0	0

PIN NO.	IC 3502				
	STOP	REC	PLAY	CUE	REV
PIN 1	4.7	0.6	4.7	4.7	4.7
PIN 2	1.5	1.2	1.5	1.5	1.5
PIN 3	0.9	0	0.9	0.9	0.9
PIN 4	0.8	0	0.8	0.7	0.7
PIN 5	0	0	0	0	0
PIN 6	0.8	0	0.7	0.7	0.8
PIN 7	0.9	0	0.9	0.8	0.9
PIN 8	3.1	0	3.1	3.1	3.1
PIN 9	3.0	0	3.1	2.8	3.1
PIN 10	2.7	0	2.7	4.0	3.2
PIN 11	3.1	0.5	3.1	3.0	3.0
PIN 12	1.6	0	1.6	1.6	1.6
PIN 13	3.0	0.5	3.0	3.0	3.1
PIN 14	0	0	0	0	0
PIN 15	4.7	0.6	4.7	4.6	4.7
PIN 16	3.3	0.5	3.5	3.2	3.4
PIN 17	3.1	0	3.2	3.1	3.1
PIN 18	3.0	0.5	3.1	3.1	3.1

PIN NO.	IC3503				
	STOP	REC	PLAY	CUE	REV
PIN 1	4.7	0.6	4.7	4.7	4.7
PIN 2	1.5	1.2	1.5	1.5	1.5
PIN 3	0.9	0	0.9	0.9	0.9
PIN 4	0.7	0	0.8	0.7	0.8
PIN 5	0	0	0	0	0
PIN 6	0.8	0	0.7	0.8	0.8
PIN 7	0.9	0	0.9	0.9	0.9
PIN 8	3.0	0.6	3.1	3.1	3.1
PIN 9	2.9	0	2.9	3.0	3.0
PIN 10	4.0	0	4.1	3.5	3.5
PIN 11	3.0	0.6	3.0	3.1	3.0
PIN 12	1.5	0	1.5	1.5	1.6
PIN 13	3.0	0.6	3.0	3.1	3.0
PIN 14	0.	0	0	0	0
PIN 15	0.2	0.6	0.2	1.7	1.6
PIN 16	0.2	0	0.2	2.0	1.9
PIN 17	2.9	0	2.9	2.9	2.9

HEAD AMP SCHEMATIC DIAGRAM

VOLTAGE MEASUREMENT:
 COLOR BAR SIGNAL IN SP REC MODE WITH BRACKET.
 COLOR BAR SIGNAL IN SP PLAY MODE WITHOUT BRACKET.

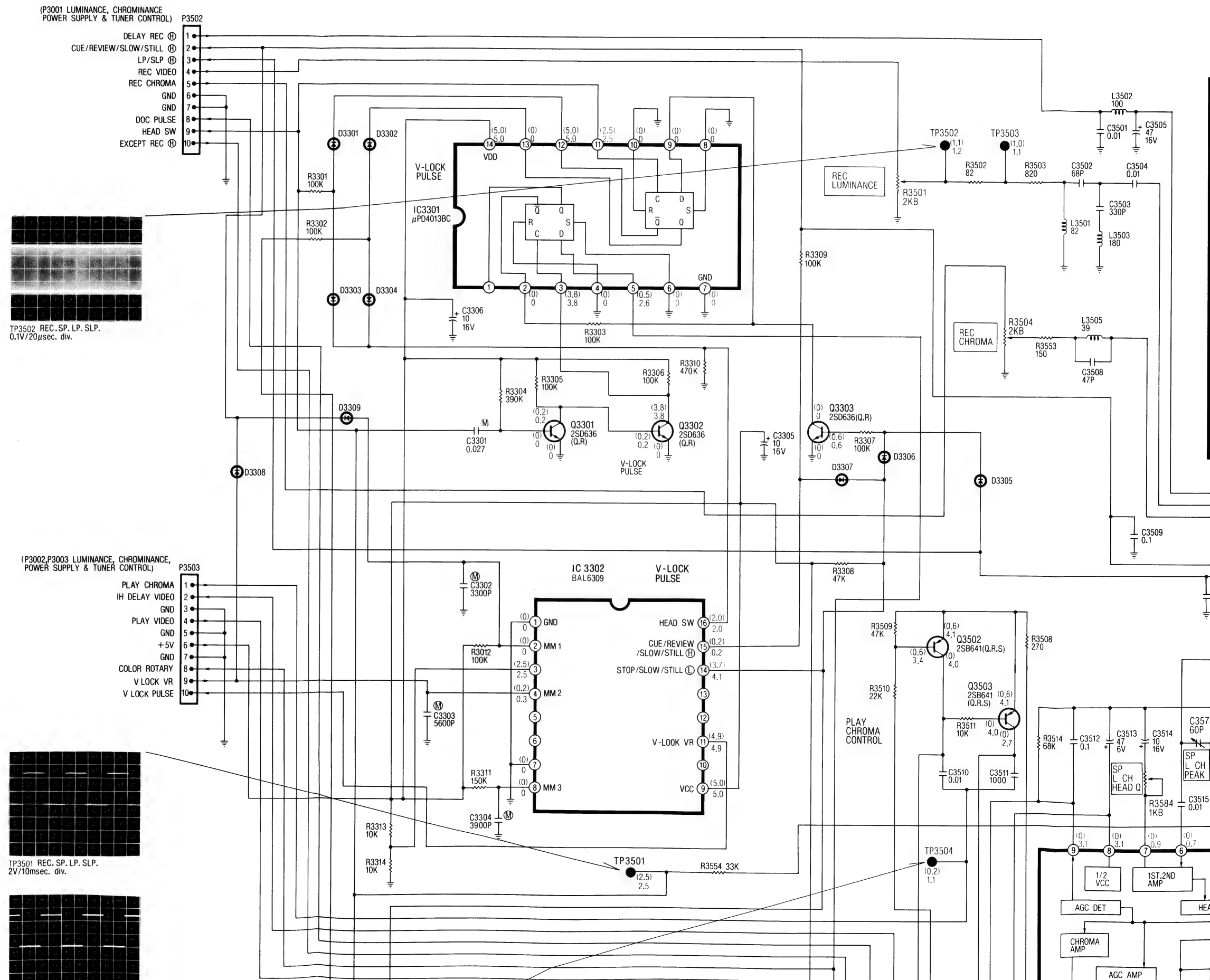
G

F

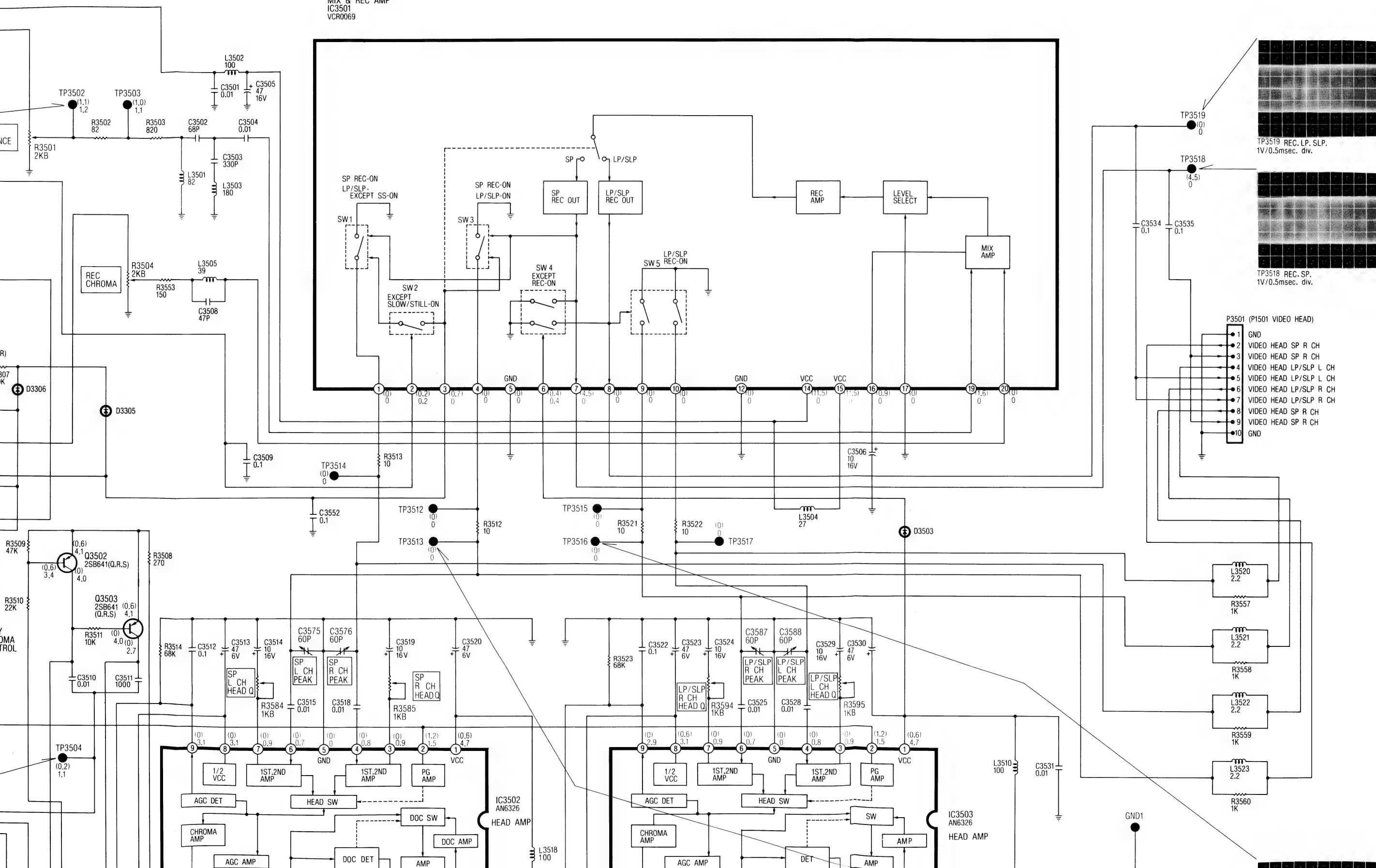
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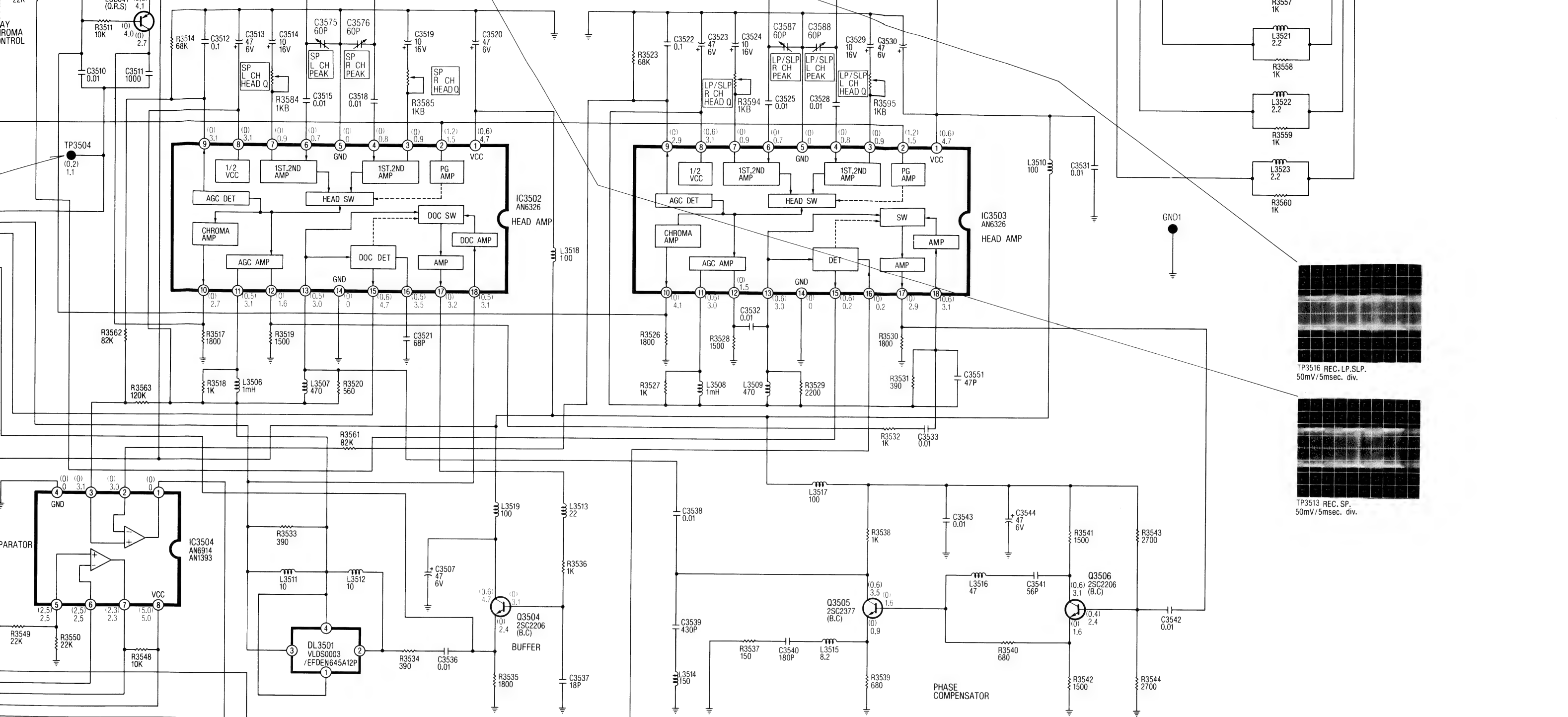
D

C



MIX & REC AMP
IC3501
VCR0069





5 6 7 8 9 10

REV		
E	B	C
0	0	0.2
0	0.2	3.8
0	0.6	0

	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q3502	4.1	3.4	4.0	0.6	0.6	0	4.1	3.4	4.0	4.1	3.7	3.5	4.1	3.4	4.0
Q3503	4.1	4.0	2.7	0.6	0	0	4.1	4.0	2.7	4.1	3.8	3.2	4.1	3.8	3.2
Q3504	2.4	3.1	4.7	0	0	0.6	2.4	3.1	4.7	2.4	3.1	4.7	2.4	3.1	4.7
Q3505	0.9	1.6	3.5	0	0	0.6	0.9	1.6	3.5	0.9	1.7	3.5	0.9	1.7	3.5
Q3506	1.7	2.4	3.1	0	0.4	0.6	1.6	2.4	3.1	1.6	2.4	3.1	1.6	2.4	3.1

HEAD AMP SECTION	
Q3502	5-D
Q3503	5-D
Q3504	6-A
Q3505	8-A
Q3506	9-A

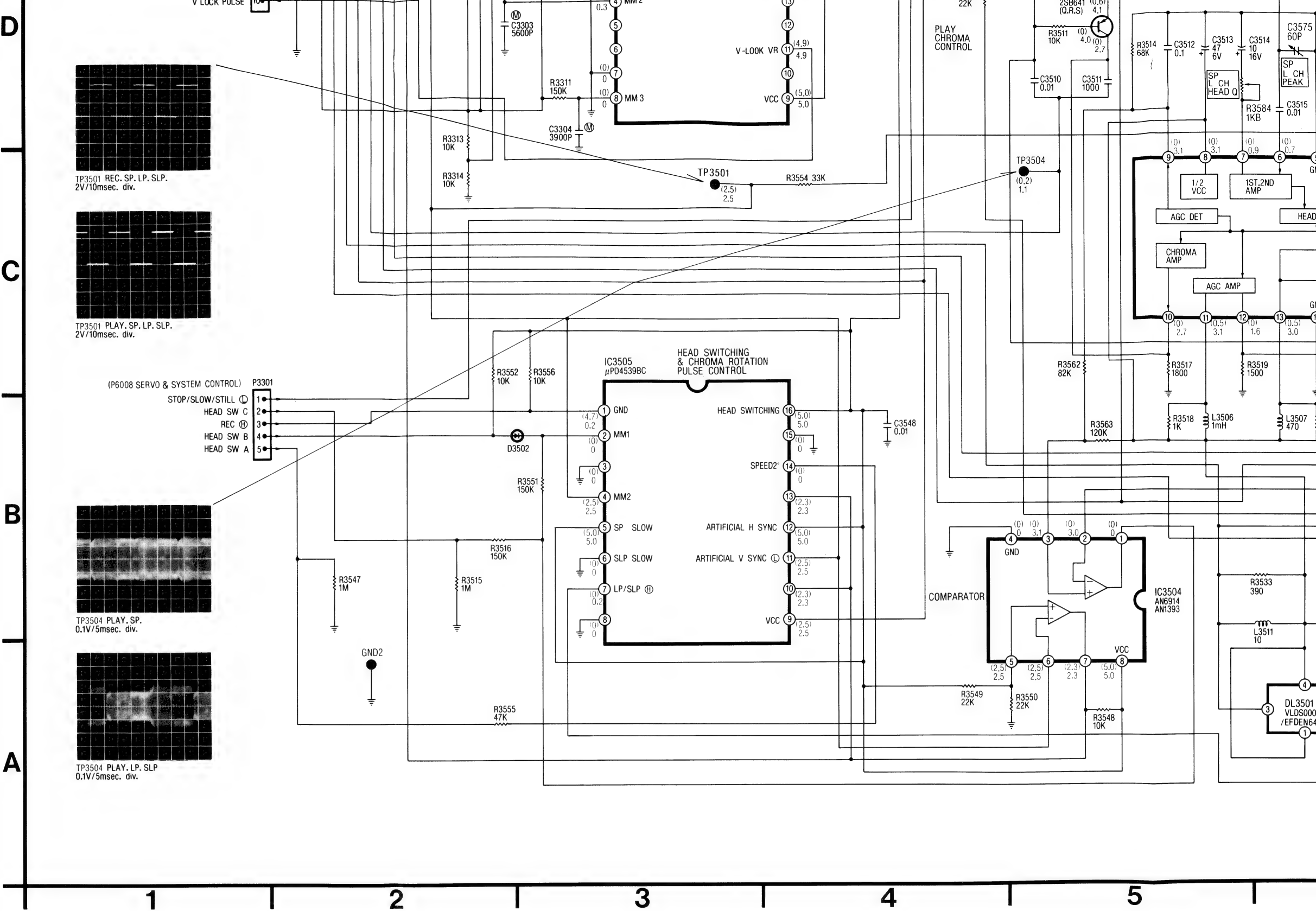
SUB LUMINANCE SECTION	
Q3301	3-E
Q3302	3-E
Q3303	4-E

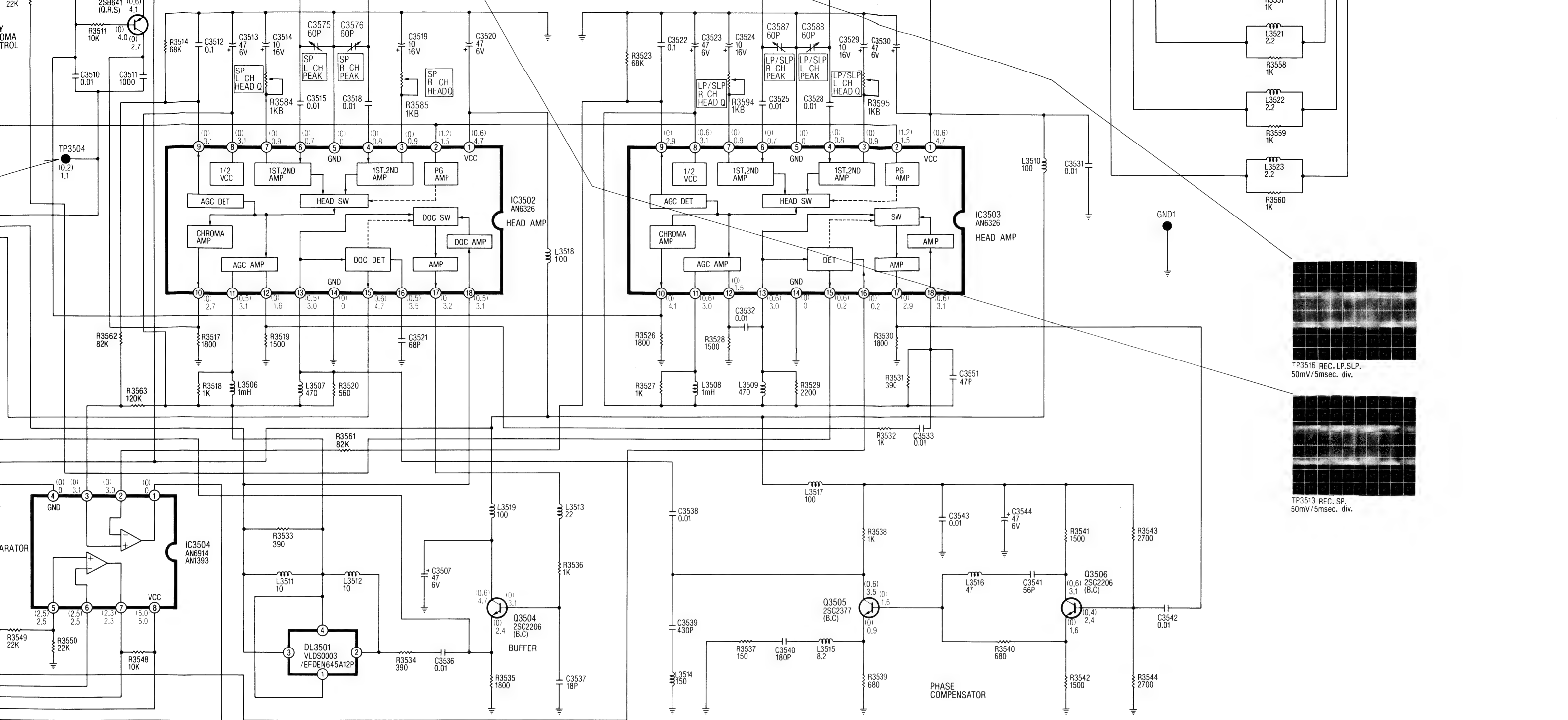
PIN 1	4.7	0.6	4.7	4.7	4.7
PIN 2	1.5	1.2	1.5	1.5	1.5
PIN 3	0.9	0	0.9	0.9	0.9
PIN 4	0.7	0	0.8	0.7	0.8
PIN 5	0	0	0	0	0
PIN 6	0.8	0	0.7	0.8	0.8
PIN 7	0.9	0	0.9	0.9	0.9
PIN 8	3.0	0.6	3.1	3.1	3.1
PIN 9	2.9	0	2.9	3.0	3.0
PIN 10	4.0	0	4.1	3.5	3.5
PIN 11	3.0	0.6	3.0	3.1	3.0
PIN 12	1.5	0	1.5	1.5	1.6
PIN 13	3.0	0.6	3.0	3.1	3.0
PIN 14	0.	0	0	0	0
PIN 15	0.2	0.6	0.2	1.7	1.6
PIN 16	0.2	0	0.2	2.0	1.9
PIN 17	2.9	0	2.9	2.9	2.9
PIN 18	3.1	0.6	3.1	3.1	3.1

PIN NO.	IC 3504				
	STOP	REC	PLAY	CUE	REV
PIN 1	0	0	0	3.9	2.6
PIN 2	2.9	0	3.0	3.1	3.0
PIN 3	3.0	0	3.1	3.1	3.1
PIN 4	0	0	0	0	0
PIN 5	2.5	2.5	2.5	2.5	2.5
PIN 6	4.9	2.5	2.5	2.5	2.5
PIN 7	0	2.3	2.3	2.3	2.3
PIN 8	5.0	5.0	5.0	5.0	5.0

PIN NO.	IC 3505				
	STOP	REC	PLAY	CUE	REV
PIN 1	0.2	4.7	0.2	0.2	0.2
PIN 2	0	0	0	2.5	2.6
PIN 3	0	0	0	0	0
PIN 4	4.9	2.5	2.5	2.5	2.5
PIN 5	5.0	5.0	5.0	5.0	5.0
PIN 6	0	0	0	0	0
PIN 7	0.3	0	0.2	2.0	1.9
PIN 8	0	0	0	0	0
PIN 9	0	2.5	2.5	2.2	2.2
PIN 10	0	2.3	2.3	2.3	2.3
PIN 11	4.9	2.5	2.5	2.5	2.5
PIN 12	5.0	5.0	5.0	5.0	5.0
PIN 13	0	2.3	2.3	2.3	2.3
PIN 14	0	0	0	4.1	4.1
PIN 15	0	0	0	0	0
PIN 16	5.0	5.0	5.0	5.0	5.0

TP NO.	STOP	REC	PLAY	CUE	REV
TP3501	0	2.5	2.5	2.5	2.5
TP3502	1.1	1.1	1.2	1.2	1.2
TP3503	1.0	1.0	1.1	1.1	1.1
TP3504	1.1	0.2	1.1	1.1	1.1
TP3512	0	0	0	0	0
TP3513	0	0	0	0	0
TP3514	0	0	0	0	0
TP3515	0	0	0	0	0
TP3516	0	0	0	0	0
TP3517	0	0	0	0	0
TP3518	0	4.5	0	0	0
TP3519	0	0	0	0	0





REV		
E	B	C
0	0	0.2
0	0.2	3.8
0	0.6	0

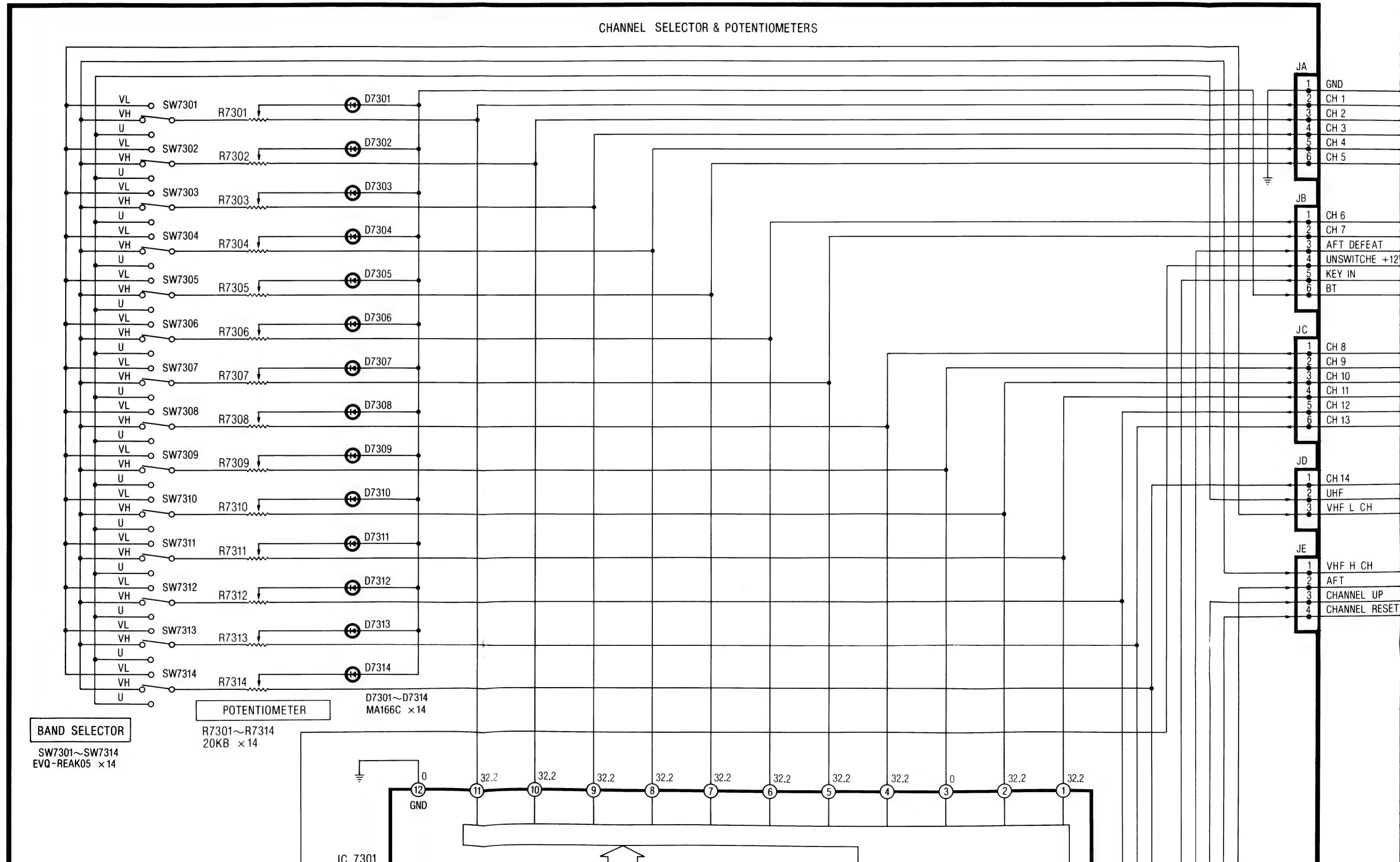
	STOP			REC			PLAY			CUE			REV		
	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C
Q3502	4.1	3.4	4.0	0.6	0.6	0	4.1	3.4	4.0	4.1	3.7	3.5	4.1	3.4	4.0
Q3503	4.1	4.0	2.7	0.6	0	0	4.1	4.0	2.7	4.1	3.8	3.2	4.1	3.8	3.2
Q3504	2.4	3.1	4.7	0	0	0.6	2.4	3.1	4.7	2.4	3.1	4.7	2.4	3.1	4.7
Q3505	0.9	1.6	3.5	0	0	0.6	0.9	1.6	3.5	0.9	1.7	3.5	0.9	1.7	3.5
Q3506	1.7	2.4	3.1	0	0.4	0.6	1.6	2.4	3.1	1.6	2.4	3.1	1.6	2.4	3.1

HEAD AMP SECTION	
Q3502	5-D
Q3503	5-D
Q3504	6-A
Q3505	8-A
Q3506	9-A

SUB LUMINANCE SECTION	
Q3301	3-E
Q3302	3-E
Q3303	4-E

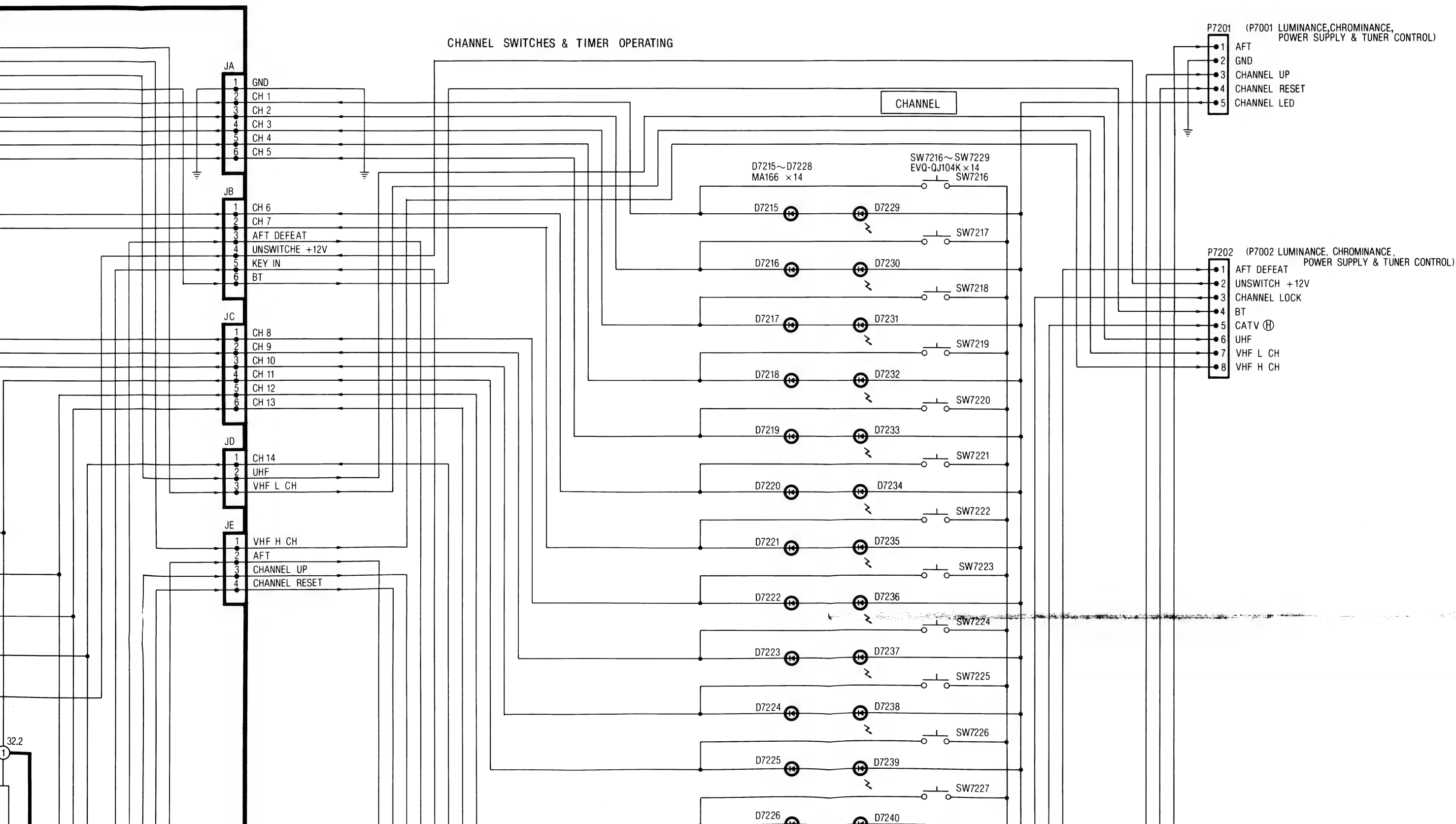
C

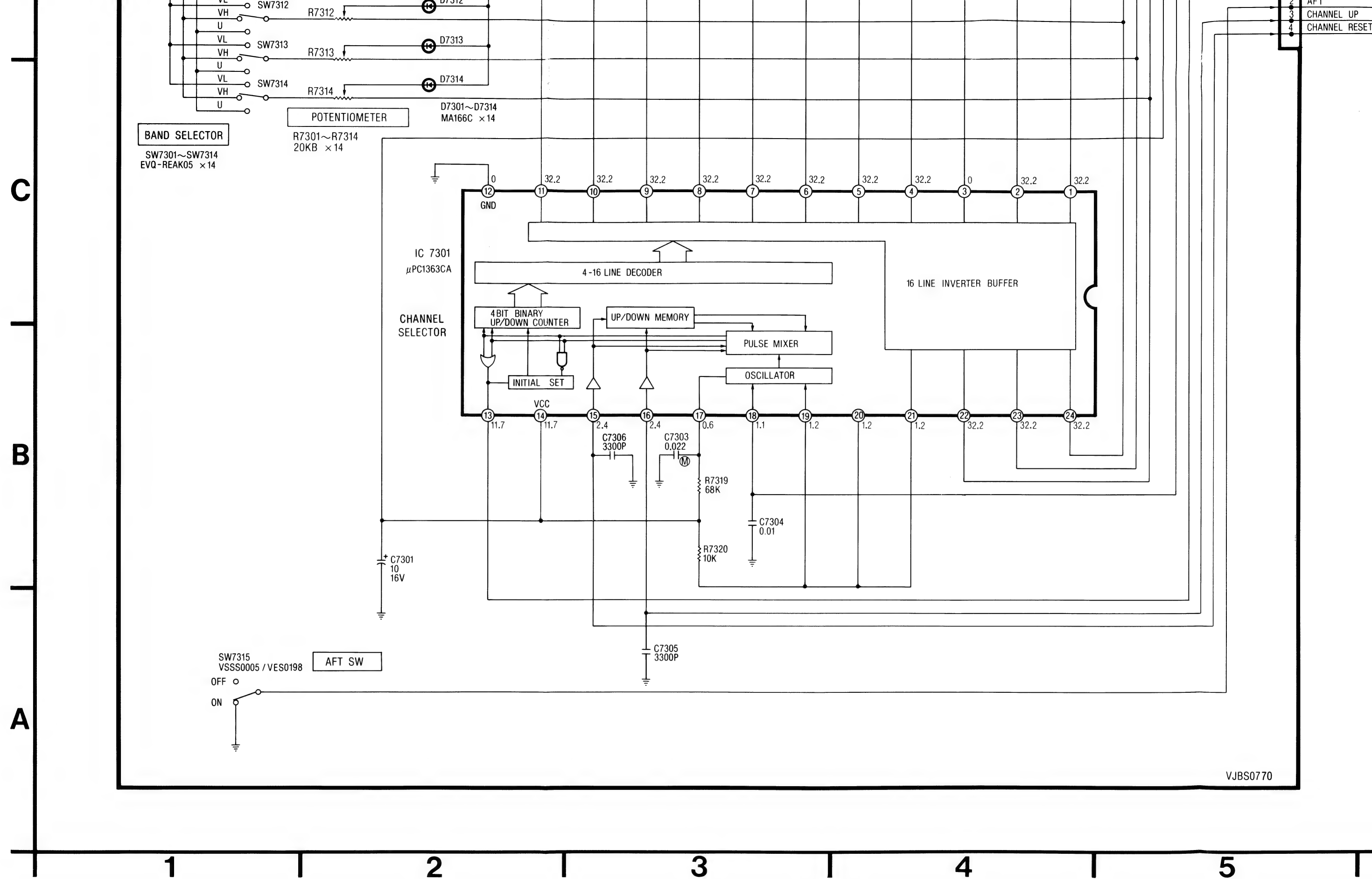
CHANNEL SELECTOR & POTENTIOMETERS



VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN STOP MODE.

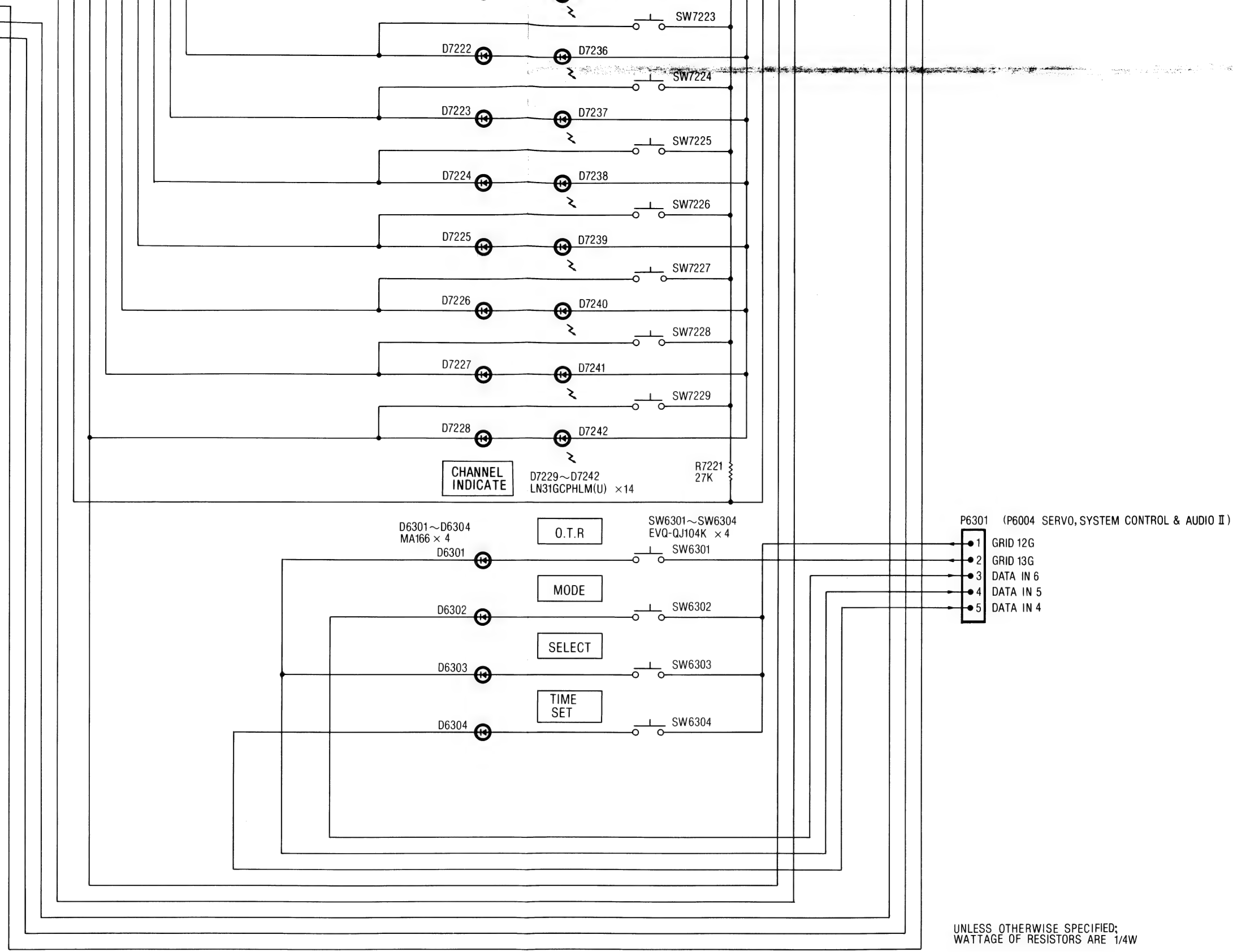
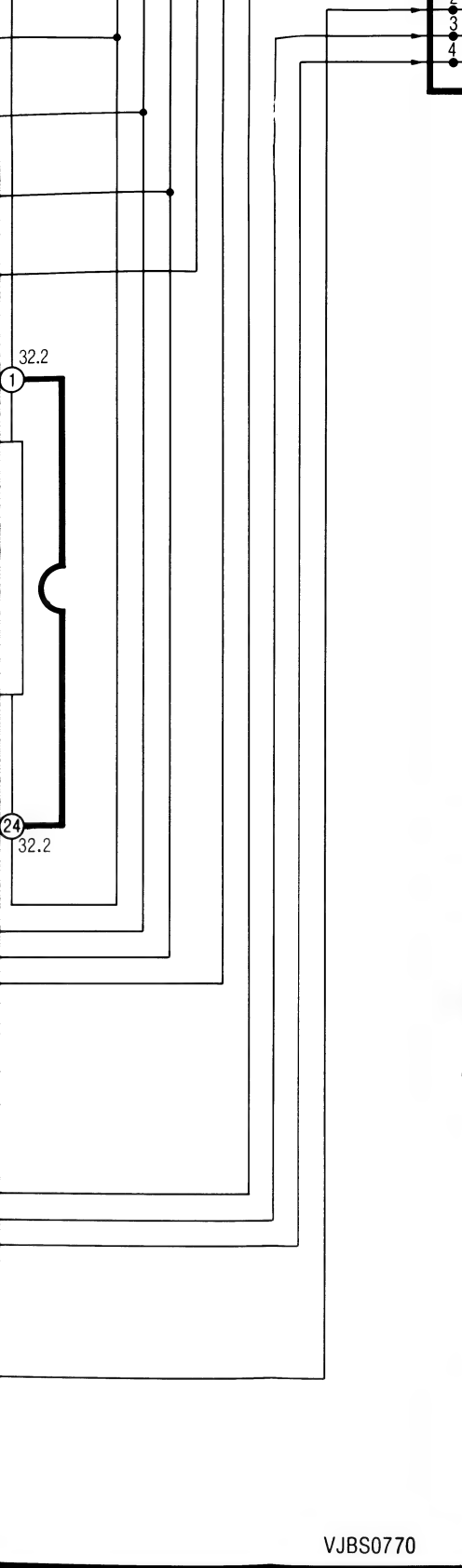
CALLOUTS NEXT TO WIRING PLUGS INDICATE
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.





VJBS0770

CHANNEL SELECTOR & POTENTIOMETERS
NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOW
EXAMPLE: C.B.A.···R2, REF. NO. 7300 SERIES
SCHEMATIC DIAGRAM···R7302
(R7302 IS ABBREVIATED TO R2)



UNLESS OTHERWISE SPECIFIED;
WATTAGE OF RESISTORS ARE 1/4W

CHANNEL SELECTOR & POTENTIOMETERS SECTION

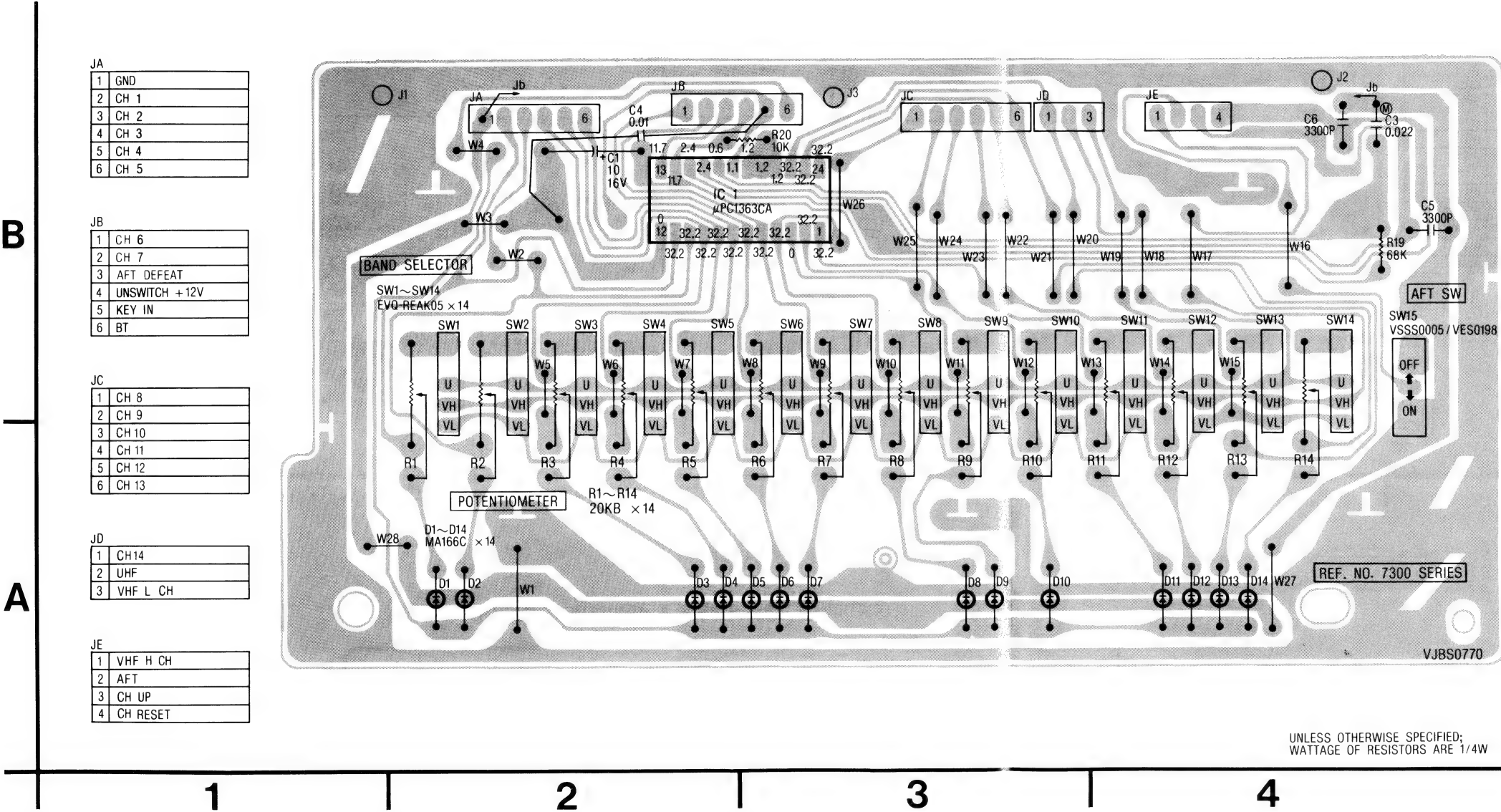
NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A. ...R2, REF. NO. 7300 SERIES
SCHEMATIC DIAGRAM...R7302
(R7302 IS ABBREVIATED TO R2)

CHANNEL SWITCHES & TIMER OPERATING SECTION

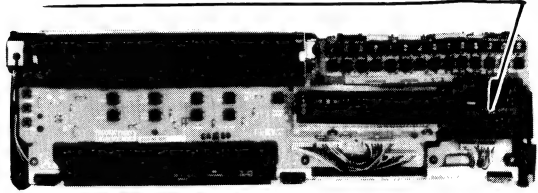
NOTE: REF. NO. ON C.B.A. IS PRINTED AS FOLLOWS.
EXAMPLE: C.B.A. ...R2, REF. NO. 7200 SERIES
SCHEMATIC DIAGRAM...R7202
(R7202 IS ABBREVIATED TO R2)

CHANNEL SELECTOR & POTENTIOMETERS C.B.A. VEPS0770A

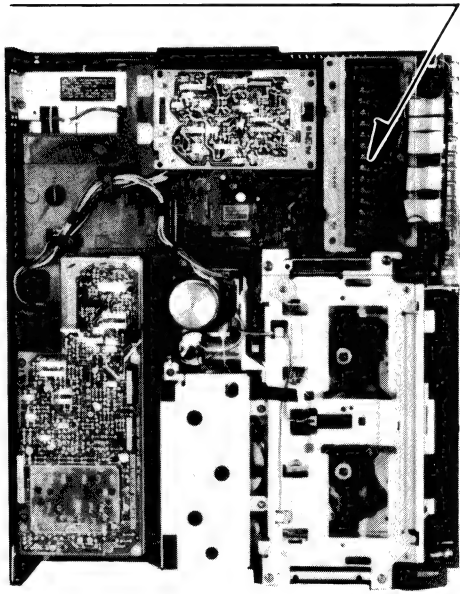
VOLTAGE MEASUREMENT: COLOR BAR SIGNAL
IN STOP MODE.



CHANNEL SWITCHES
& TIMER OPERATING C.B.A.



CHANNEL SELECTOR
& POTENTIOMETERS C.B.A.

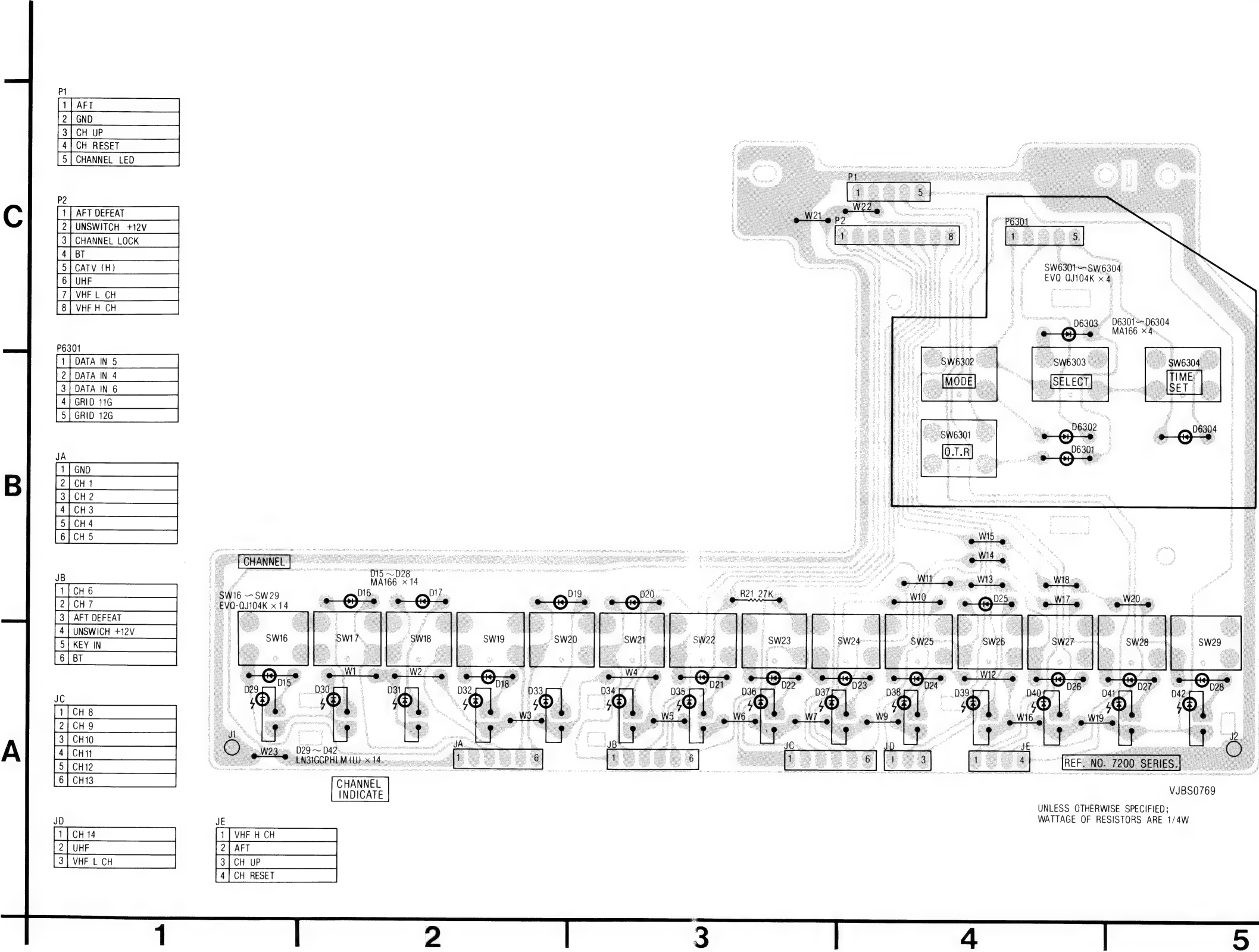
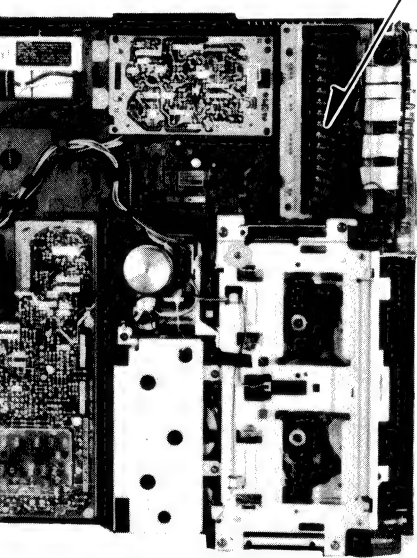


CHANNEL SWITCHES & TIMER OPERATING C.B.A. VEPS0769A

4-11
CHANNEL SELECTOR
& POTENTIOMETERS C.B.A.
/CHANNEL SWITCHES
& TIMER OPERATING C.B.A.

CHANNEL SWITCHES
& TIMER OPERATING C.B.A.

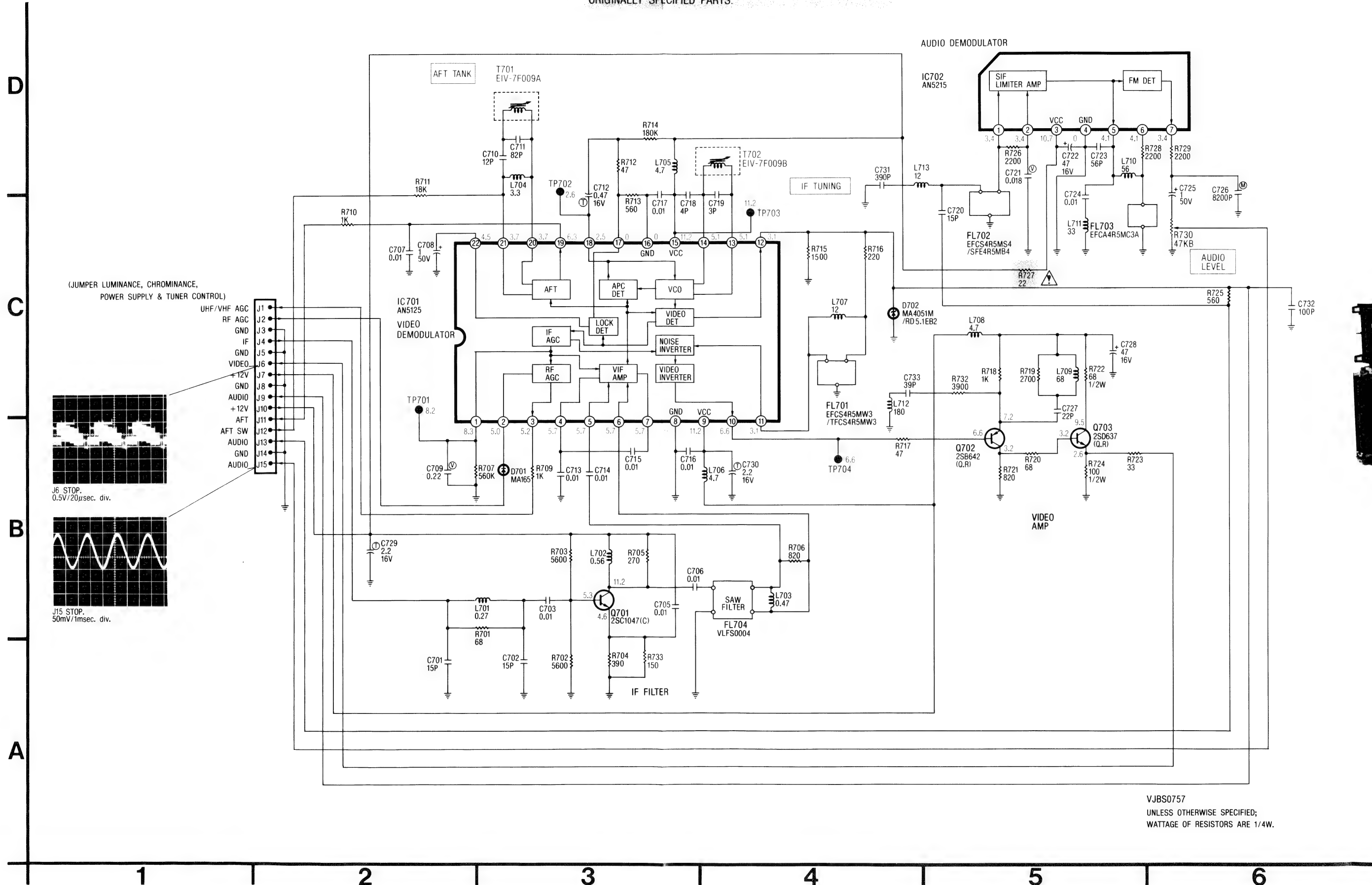
CHANNEL SELECTOR
& POTENTIOMETERS C.B.A.



TV DEMODULATOR SCHEMATIC DIAGRAM

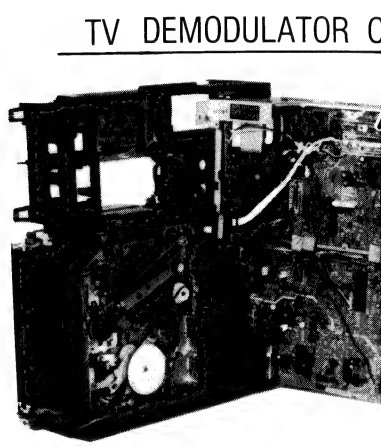
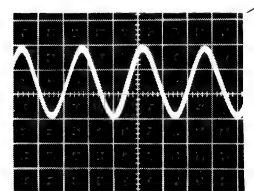
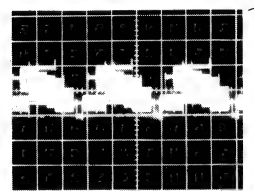
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚡ HAVE SPECIAL
CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE
ORIGINALLY SPECIFIED PARTS.

VOLTAGE MEASUREMENT: COLOR BAR SIGNAL IN STOP MODE
CALLOUTS NEXT TO WIRING PLUGS INDICATE
CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.



(JUMPER LUMINANCE, CHROMINANCE,
POWER SUPPLY & TUNER CONTROL)


- J1 UHF/VHF AGC
- J2 RF AGC
- J3 GND
- J4 IF
- J5 GND
- J6 VIDEO
- J7 +12V
- J8 GND
- J9 AUDIO
- J10 +12V
- J11 AFT
- J12 AFT SW
- J13 AUDIO
- J14 GND
- J15 AUDIO



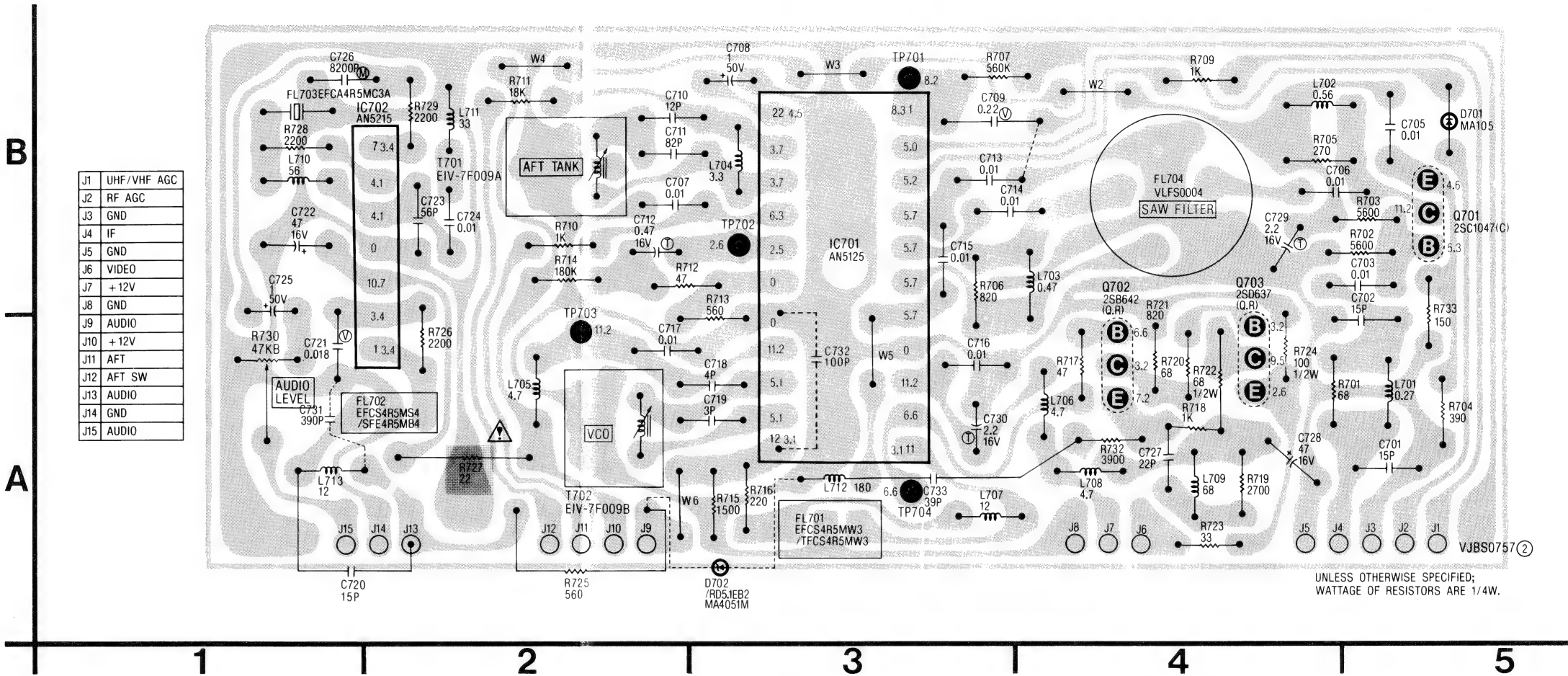
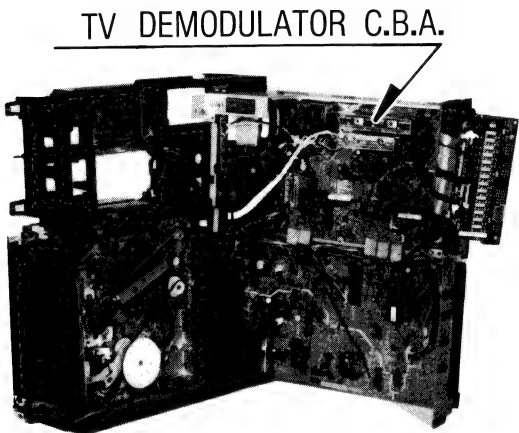
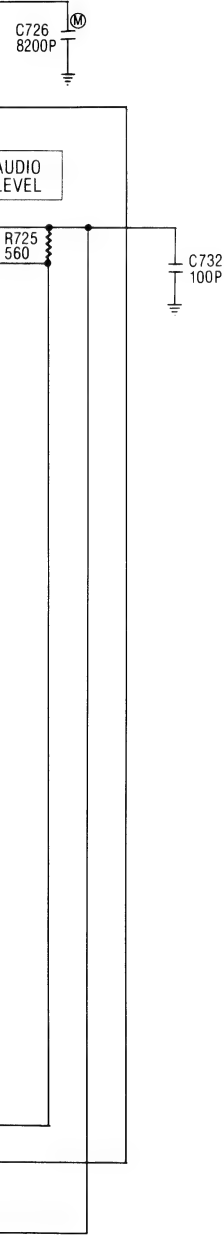
VJBS0757
UNLESS OTHERWISE SPECIFIED;
WATTAGE OF RESISTORS ARE 1/4W.

ALL OUTS NEXT TO WIRING PLUGS INDICATE CONNECTIONS TO OTHER SCHEMATIC DIAGRAM.

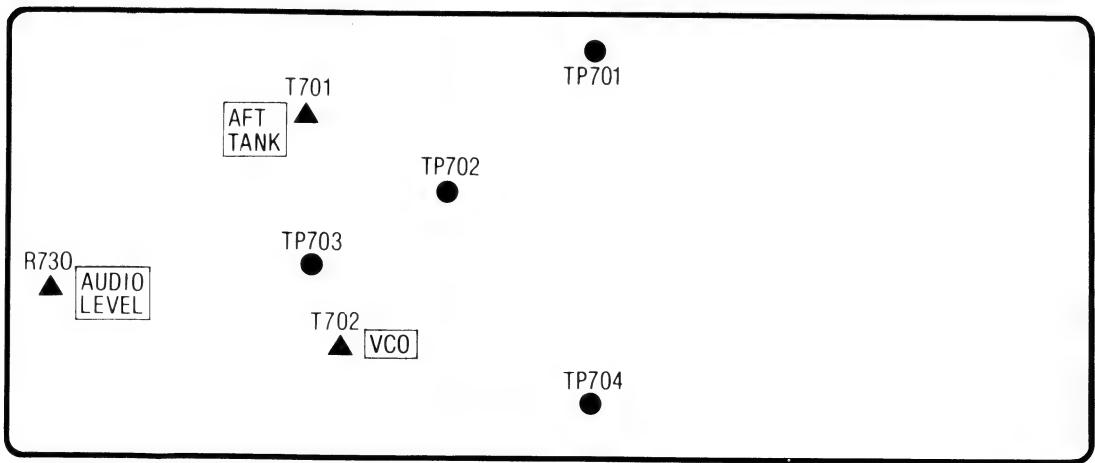
TV DEMODULATOR C.B.A. VEPS0757

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN  HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE ORIGINALLY SPECIFIED PARTS.

VOLTAGE MEASUREMENT: COLOR BAR SIGNAL IN STOP MODE

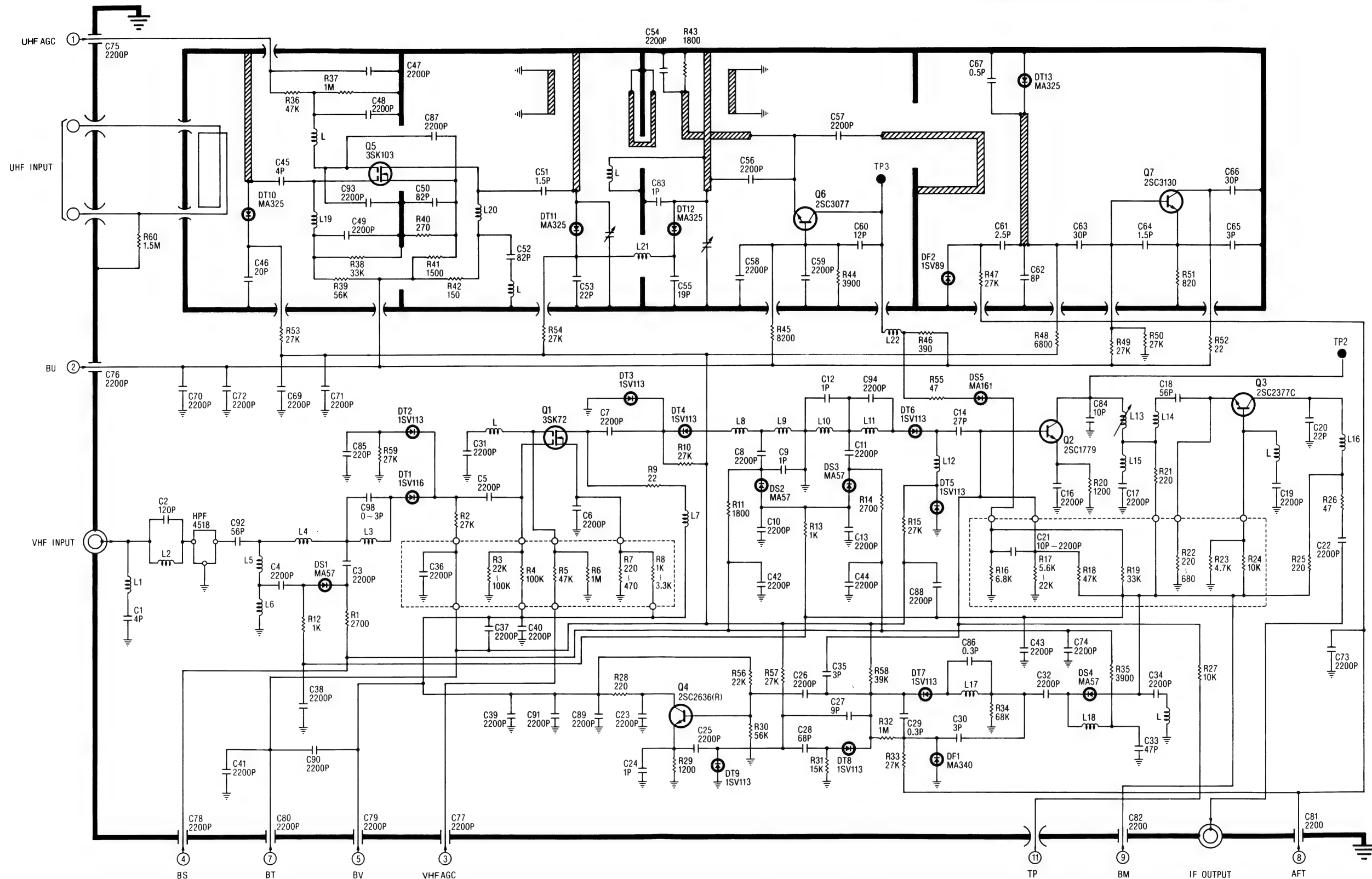


LOCATION OF TEST POINTS & ADJUSTMENT POINTS



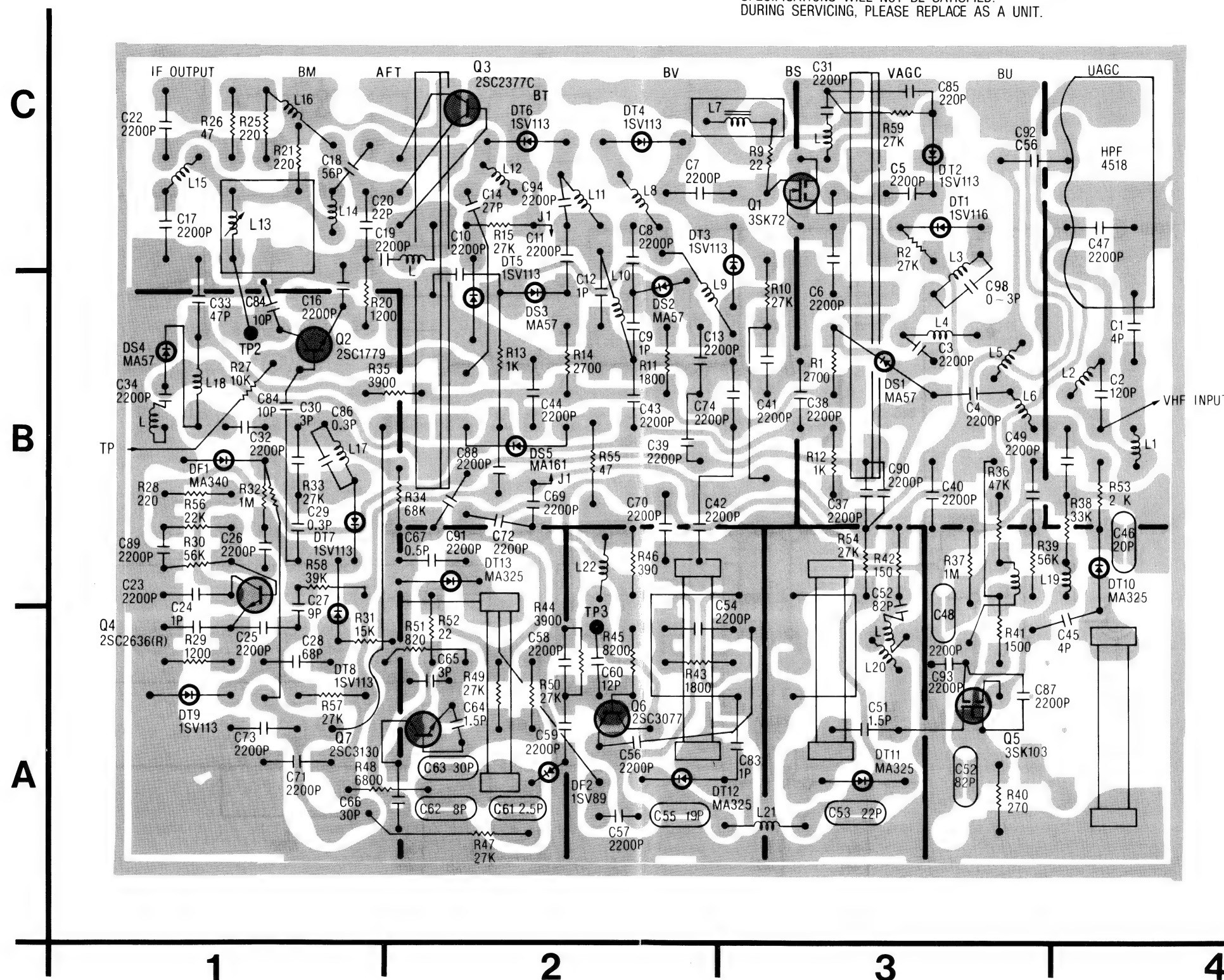
UHF/VHF TUNER SCHEMATIC DIAGRAM (TNV56751F2)

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

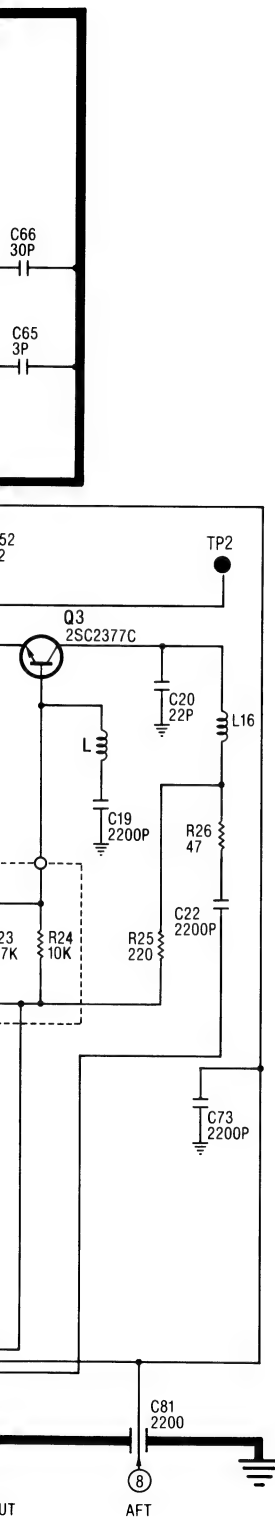


UHF/VHF TUNER UNIT (TNV56751F2)

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

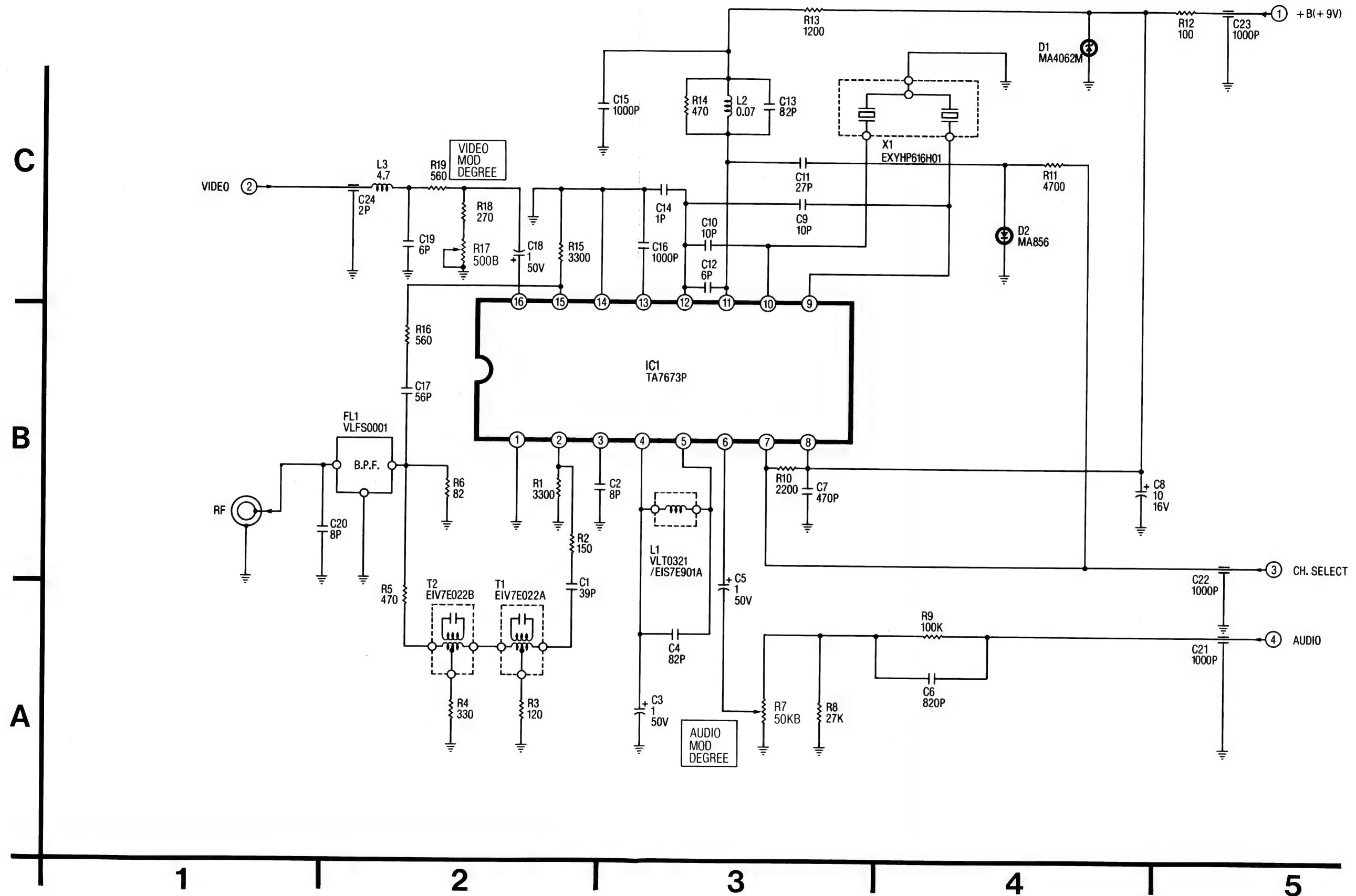


THE FCC
UNIT.



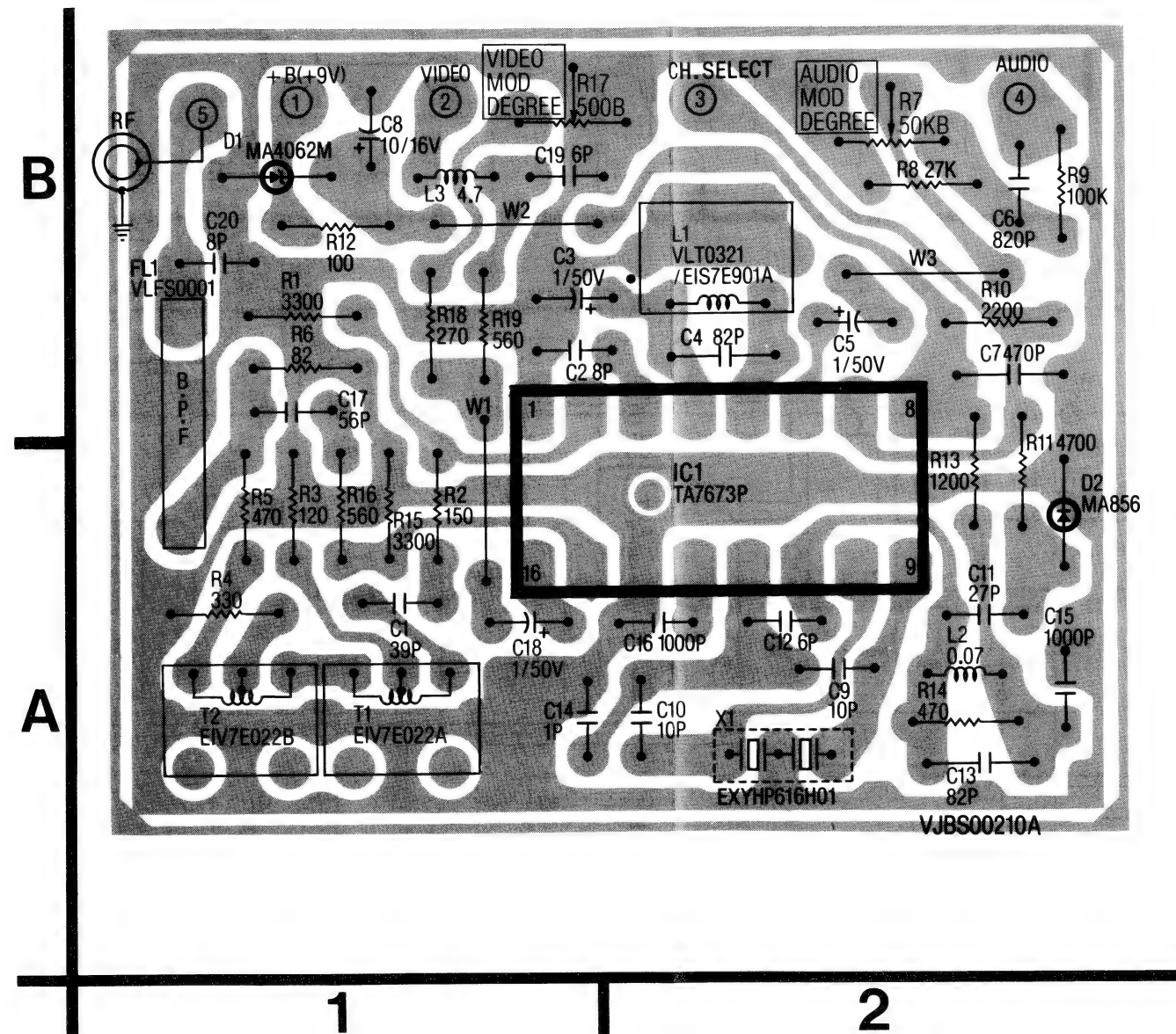
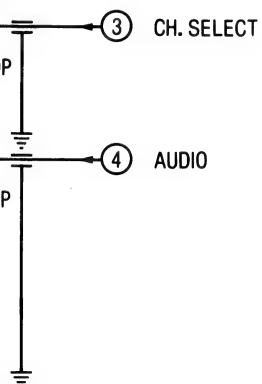
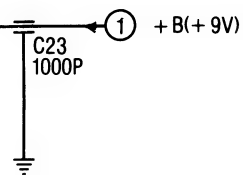
RF CONVERTER SCHEMATIC DIAGRAM (VEQS0206)

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.



RF CONVERTER UNIT (VEQS0206)

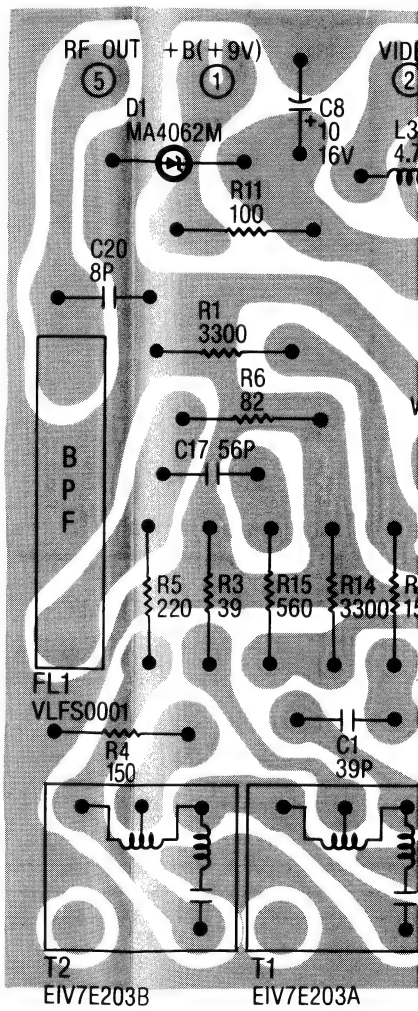
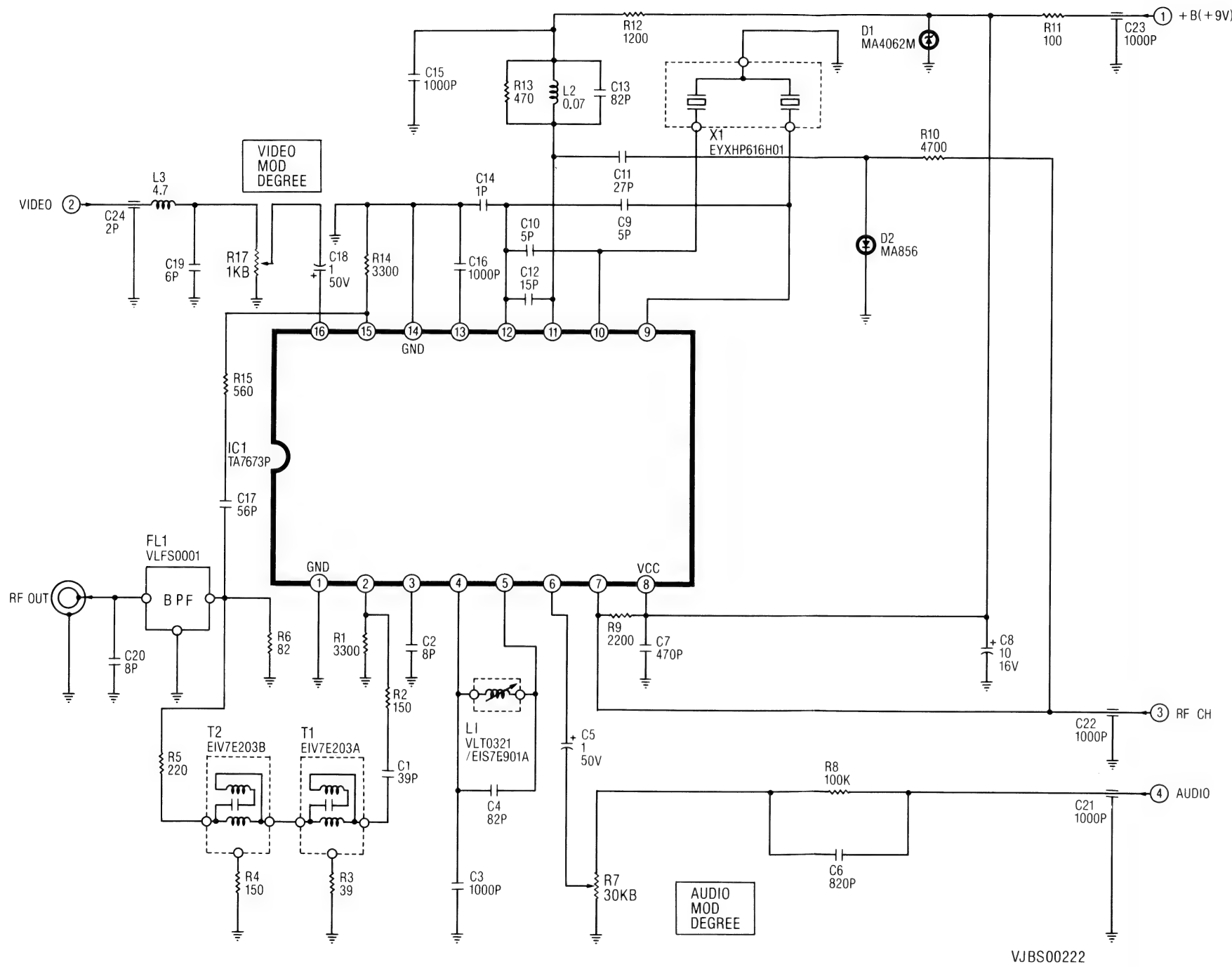
IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.



RF CONVERTER SCHEMATIC DIAGRAM (VEQS0236)

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

RF CONVERTER UNIT (VEQS0236)

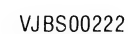


ANTENNA TERMINAL SCHEMATIC DIAGRAM

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

ANTENNA TERMINAL SCHEMATIC DIAGRAM

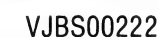
IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.



IMPORTANT NOTICE:
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SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

4-15
RF CONVERTER CIRCUIT
/ ANTENNA TERMINAL CIRCUIT

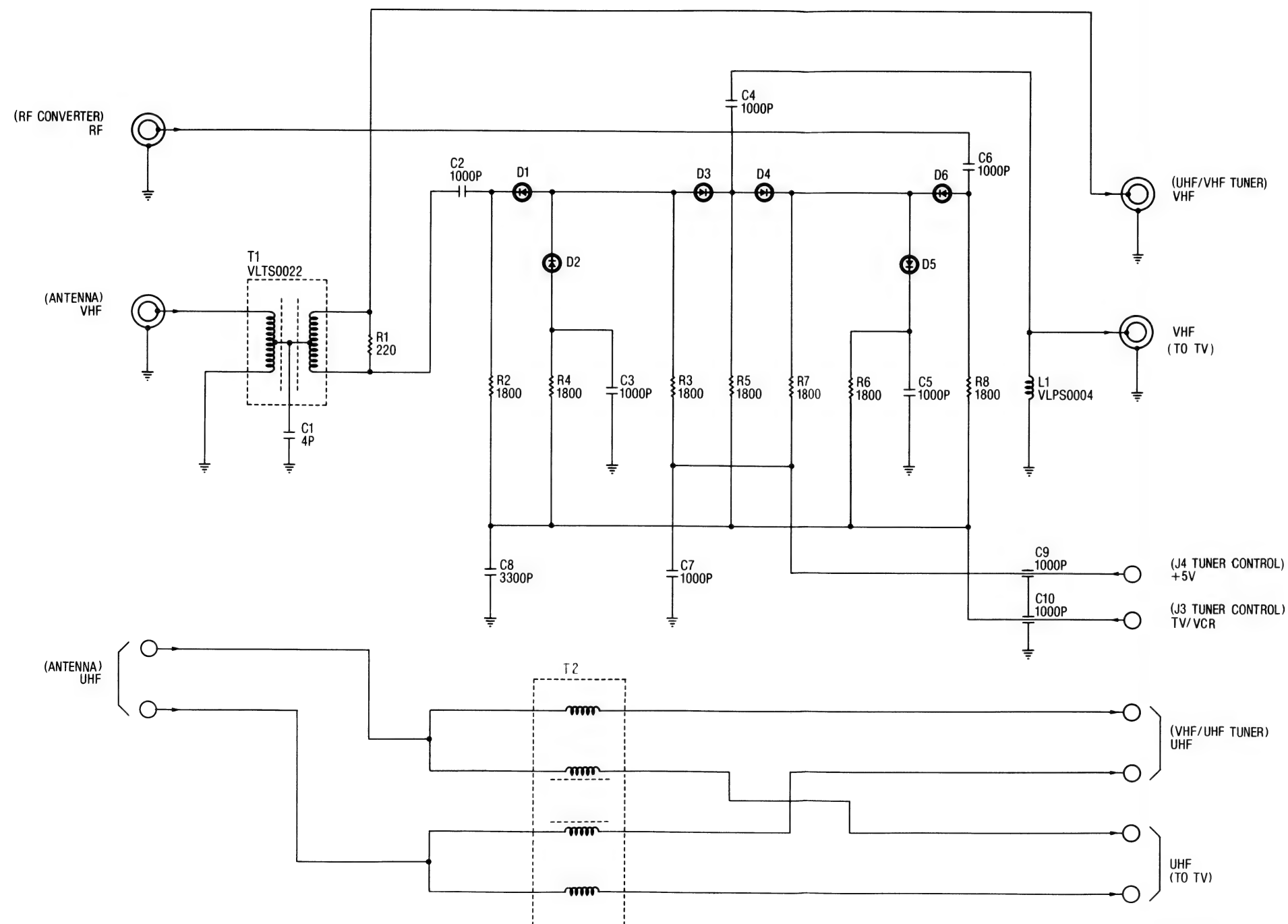
IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.



ANTENNA TERMINAL UNIT (VEJS0015)

ANTENNA TERMINAL SCHEMATIC DIAGRAM

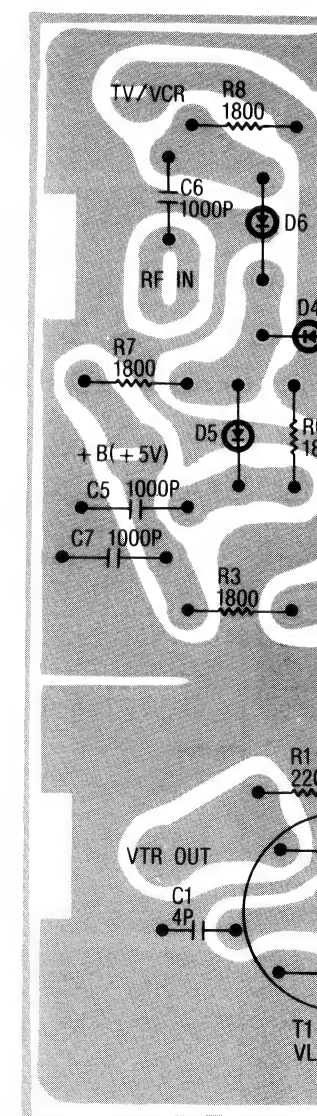
IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.



UNLESS OTHERWISE SPECIFIED;
WATTAGE OF RESISTORS ARE 1/4W AND
DIODES ARE MA858.

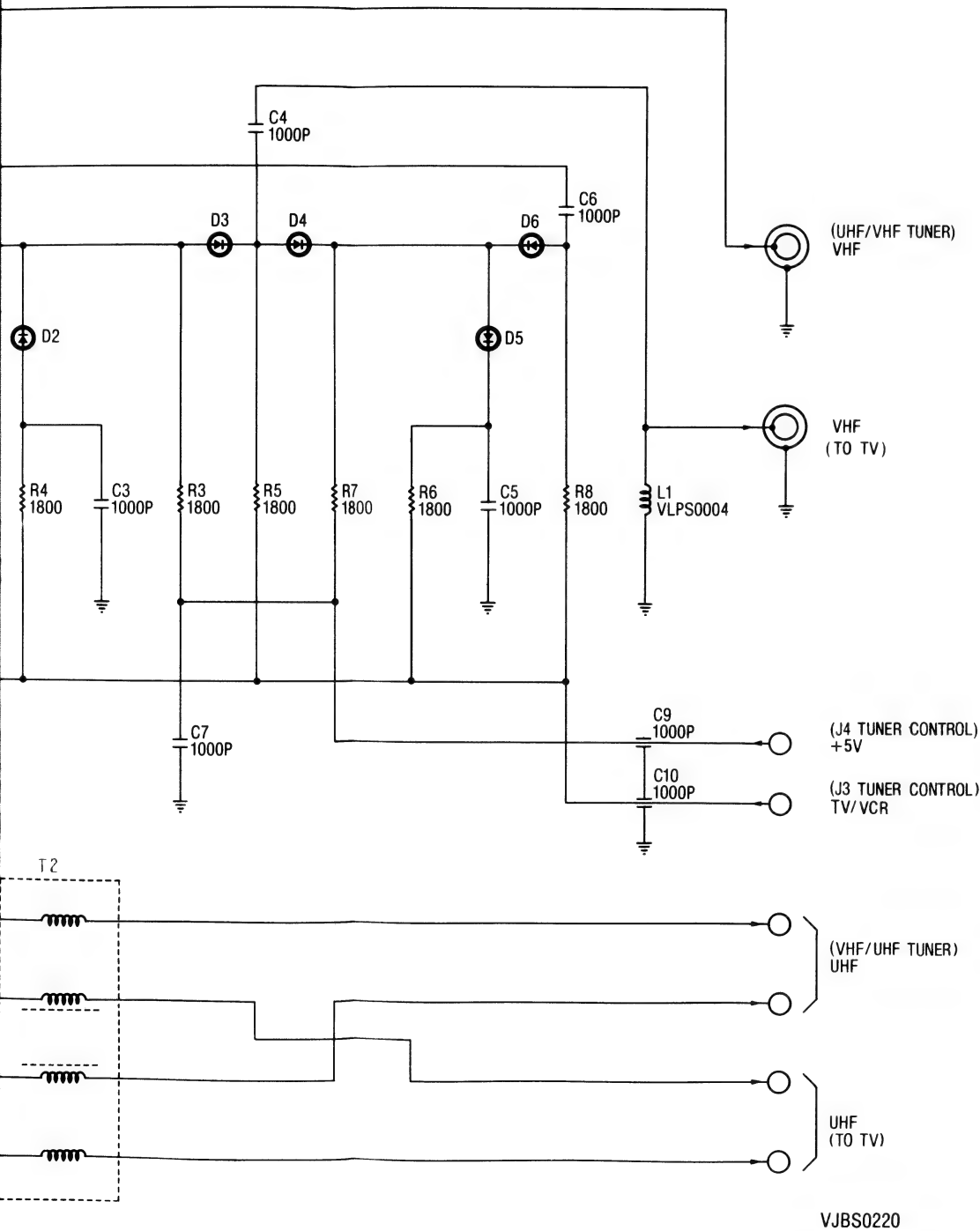
VJBS0220

ANTENNA TERMINAL SCHEMATIC DIAGRAM



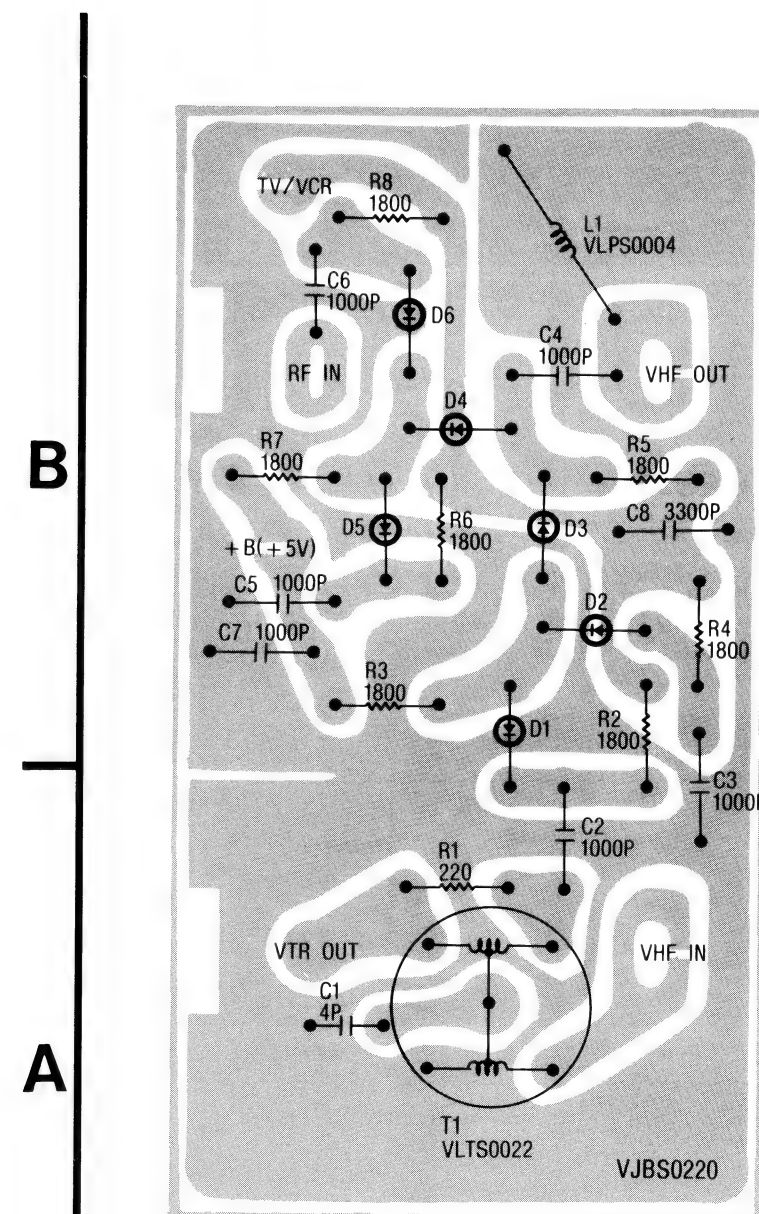
RAM

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.



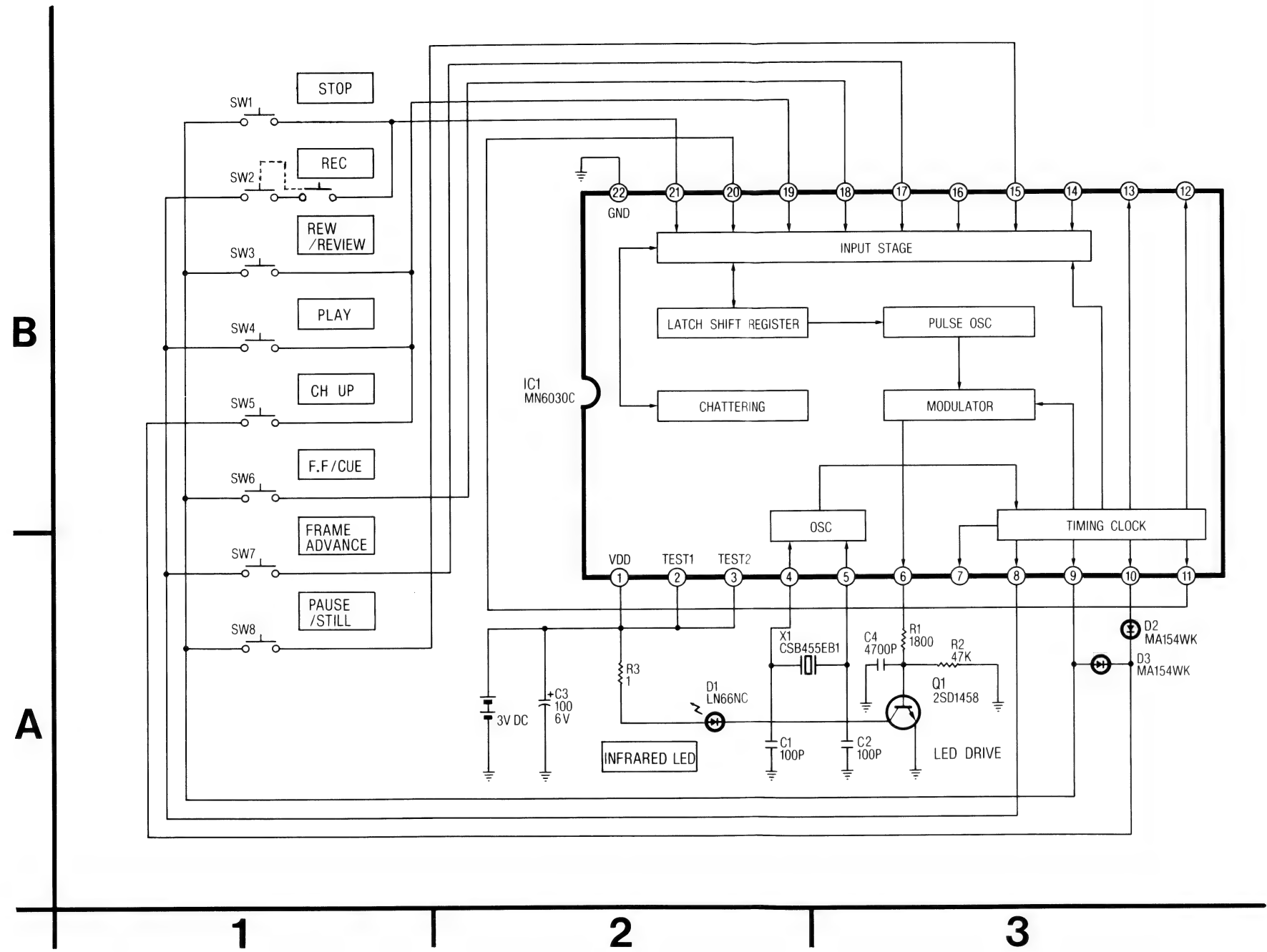
ANTENNA TERMINAL UNIT (VEJS0015)

IMPORTANT NOTICE:
IF UNIT PARTS ARE REPLACED INDIVIDUALLY, THE FCC
SPECIFICATIONS WILL NOT BE SATISFIED.
DURING SERVICING, PLEASE REPLACE AS A UNIT.

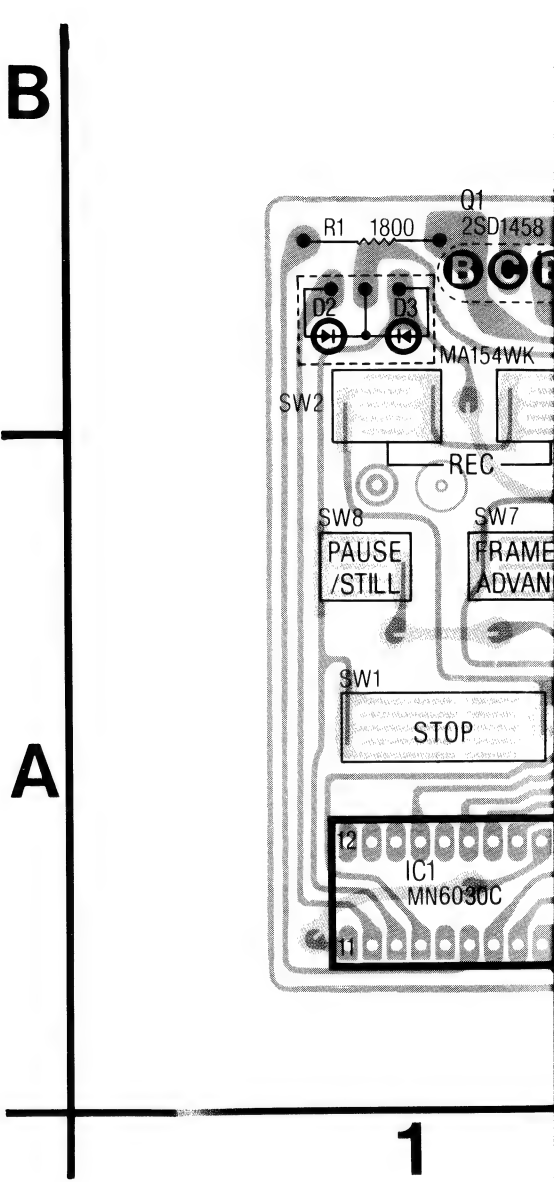


UNLESS OTHERWISE SPECIFIED;
WATTAGE OF RESISTORS ARE 1/4W AND
DIODES ARE MA858.

IR WIRELESS TRANSMITTER SCHEMATIC DIAGRAM



IR WIRELESS TRANSM



SENSOR LED C.B.A.
VEKS1367

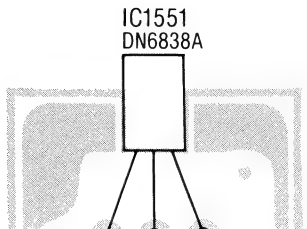
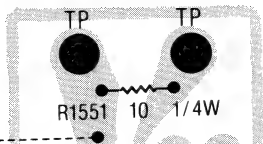
SUPPLY PHOTO TR
C.B.A.

TAKEUP PHOTO TR
C.B.A.

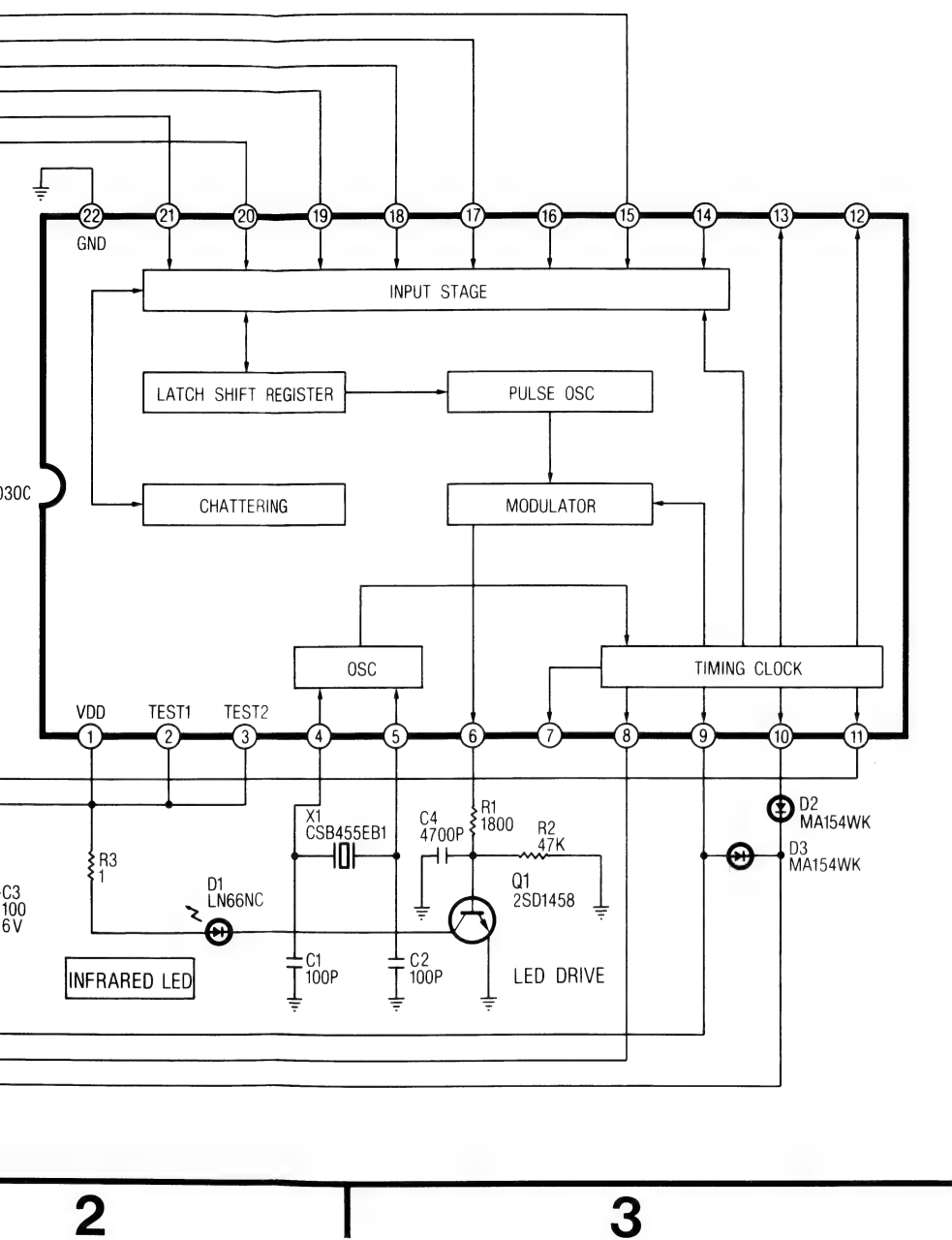
AUDIO/CONTROL
HEAD C.B.A.

REEL SENSOR C.B.A.
VEKS1119

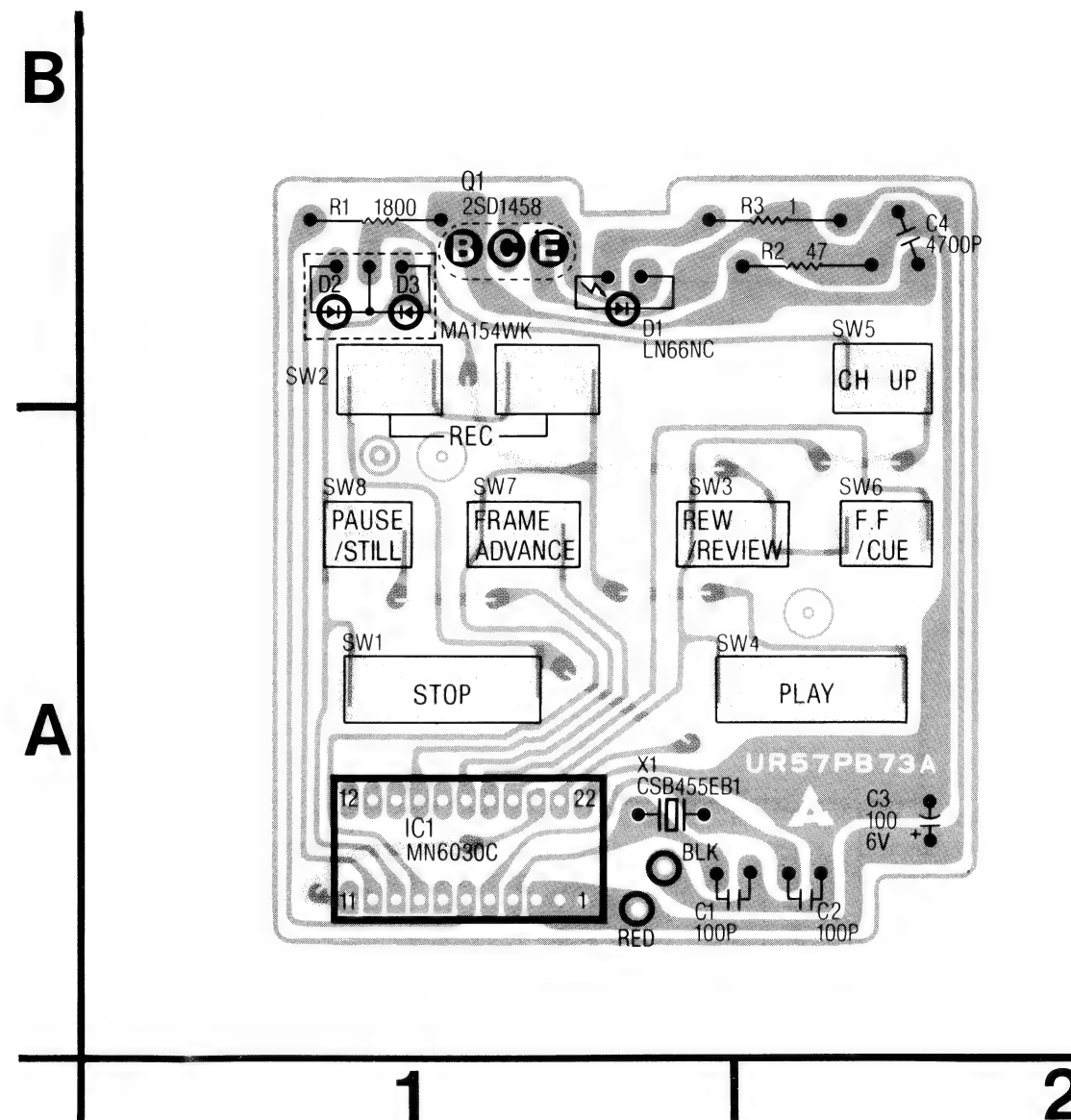
MODE SELECT SWITCH
V



CHEMATIC DIAGRAM



IR WIRELESS TRANSMITTER UNIT



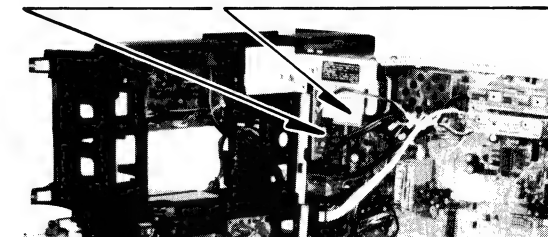
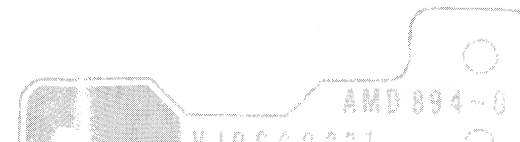
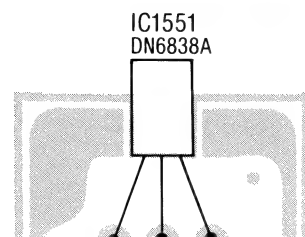
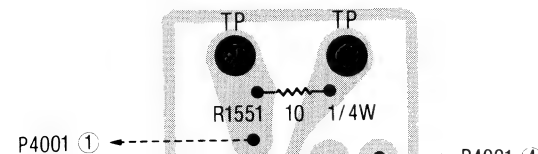
TAKEUP PHOTO TR
C.B.A.

AUDIO/CONTROL
HEAD C.B.A.

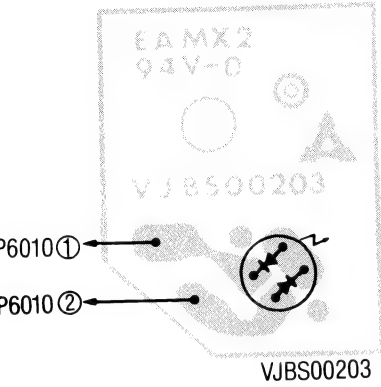
REEL SENSOR C.B.A.
VEKS1119

MODE SELECT SWITCH C.B.A.
VEKS1171

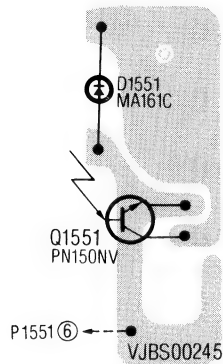
FUSE C.B.A. POWER TRANSFORMER



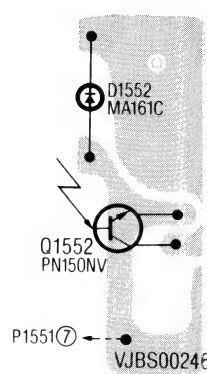
SENSOR LED C.B.A.
VEKS1367



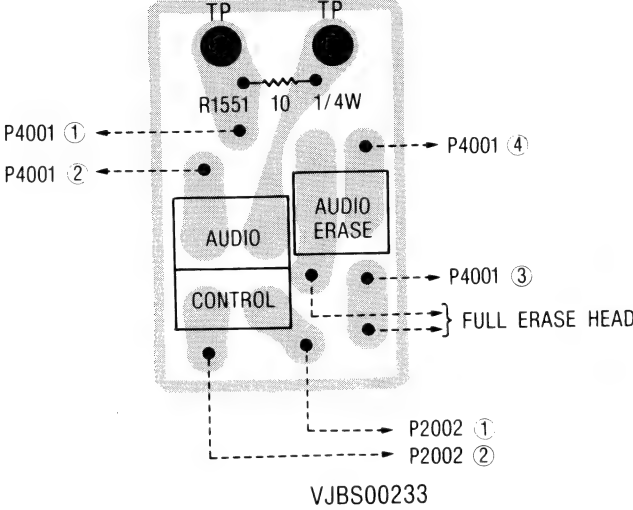
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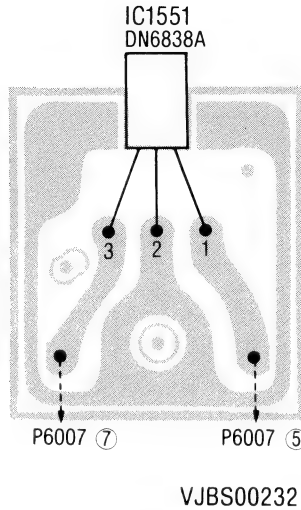
TAKEUP PHOTO TR
C.B.A.



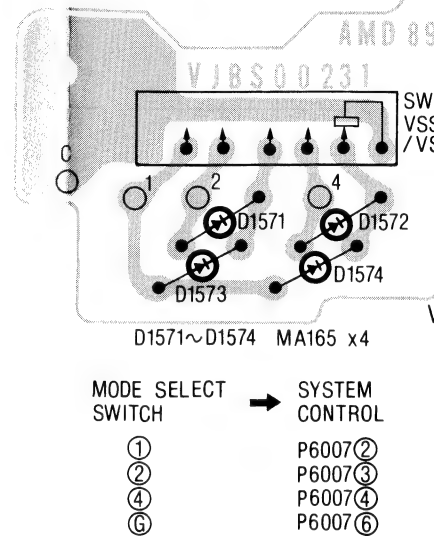
AUDIO/CONTROL
HEAD C.B.A.




REEL SENSOR C.B.A.
VEKS1119

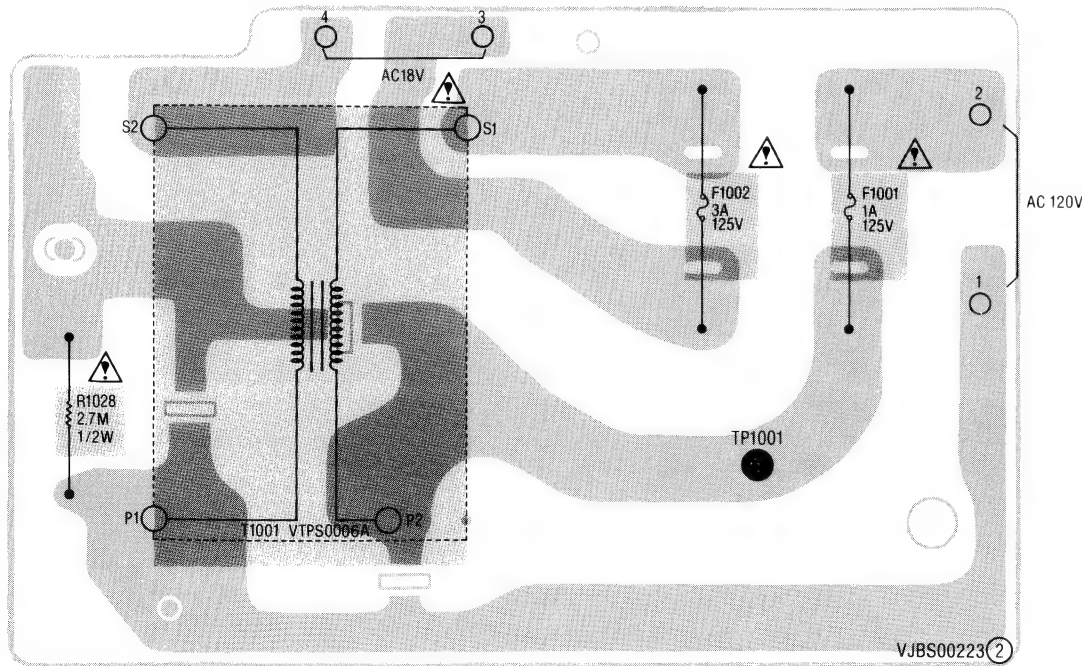


MODE SELECT SWITCH
C.B.A.

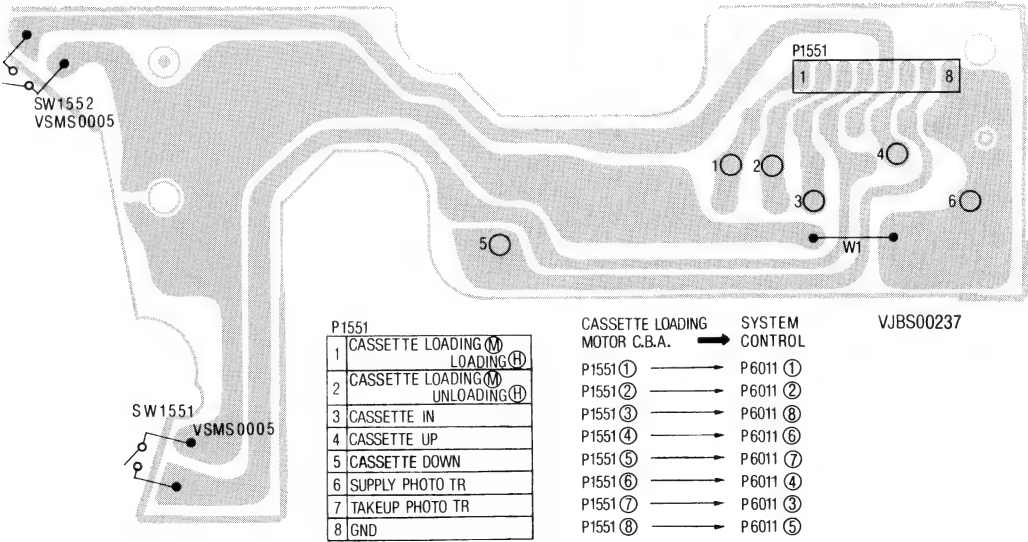


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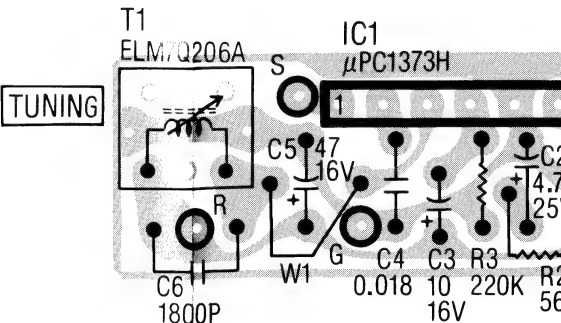
FUSE C.B.A. VEKS1129



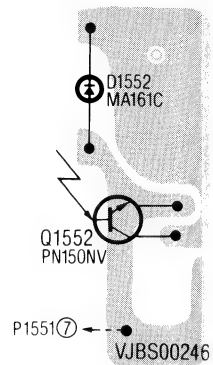
CONNECTION C.B.A.



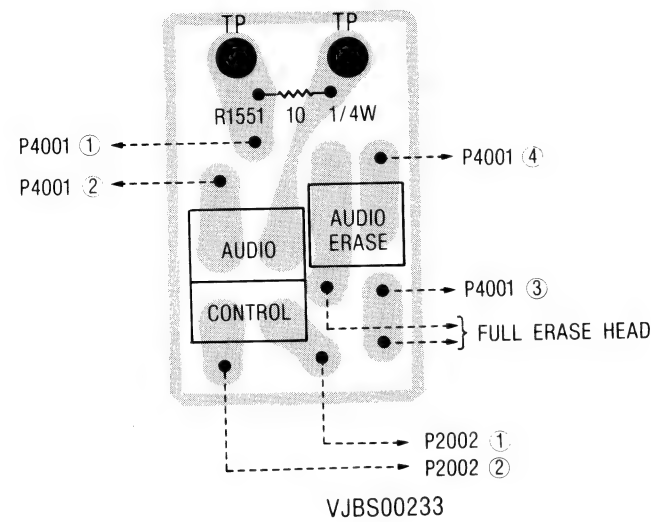
REMOTE RECEIVING DETE
VEPS



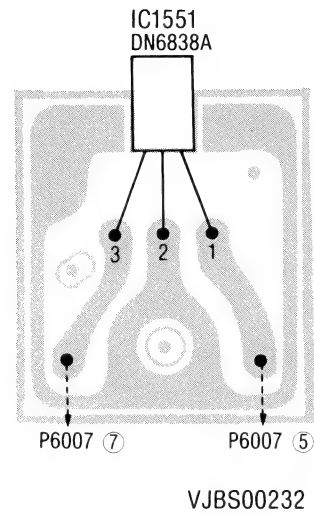
TAKEUP PHOTO TR C.B.A.



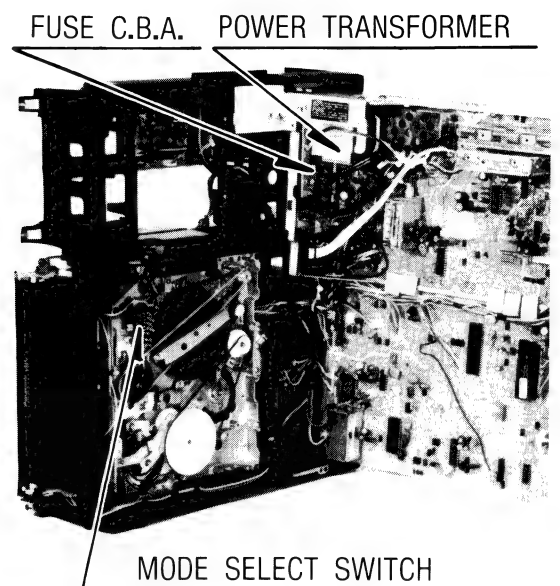
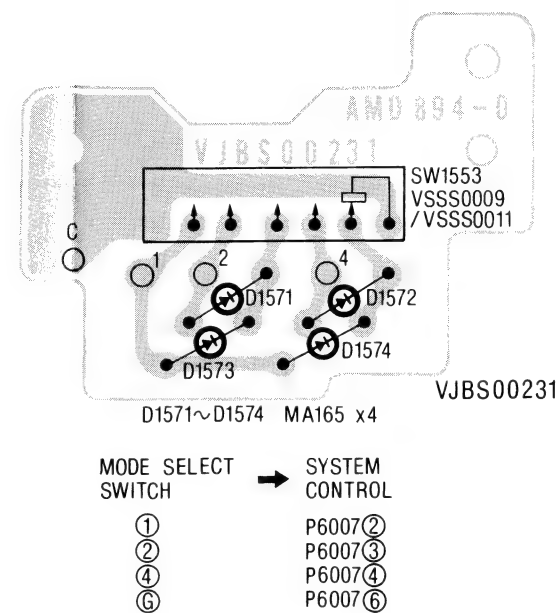
AUDIO/CONTROL HEAD C.B.A.



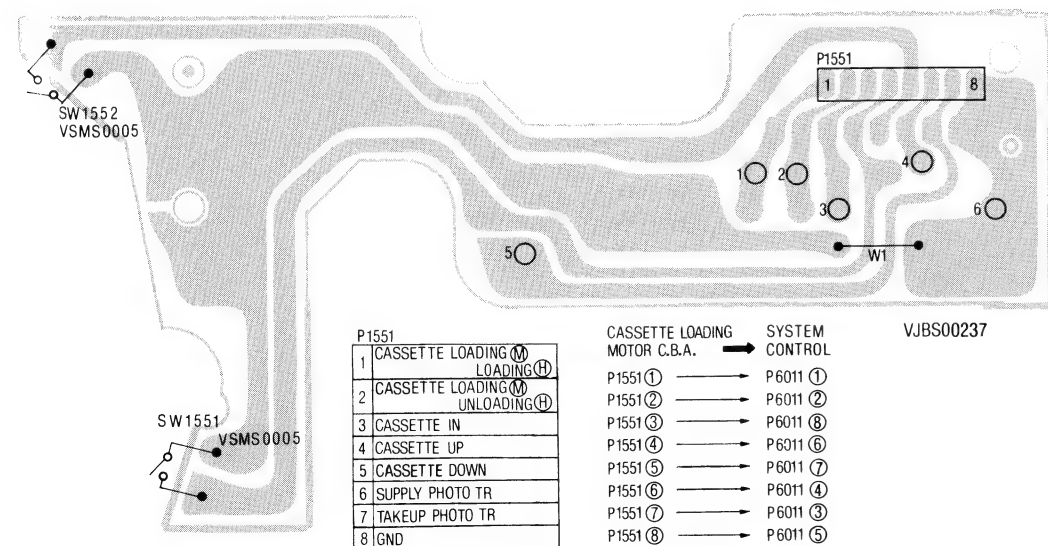
REEL SENSOR C.B.A. VEKS1119



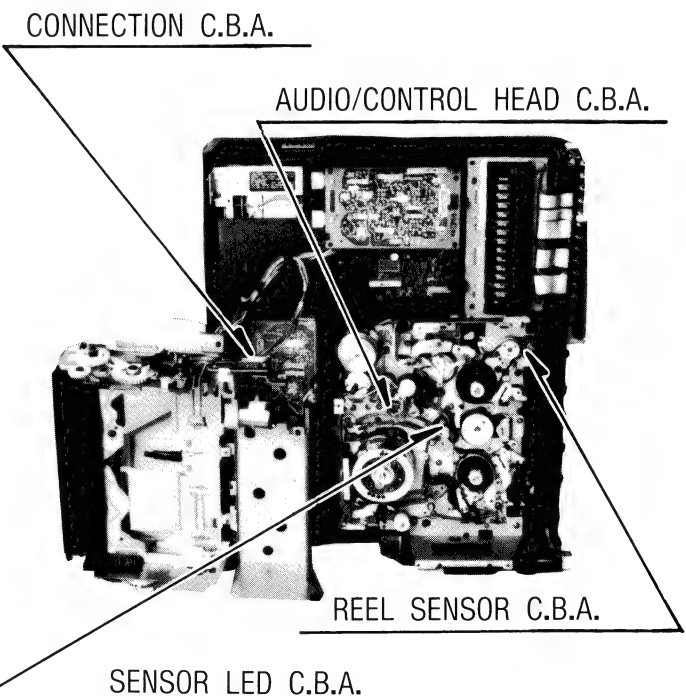
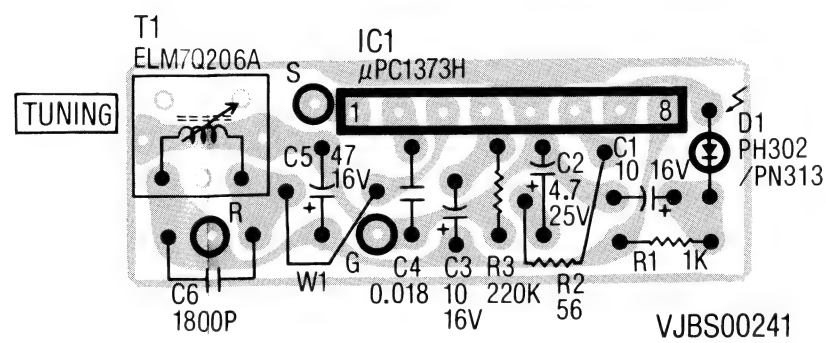
MODE SELECT SWITCH C.B.A. VEKS1171



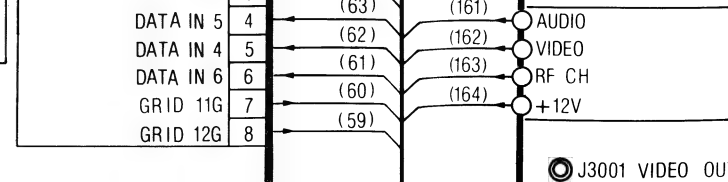
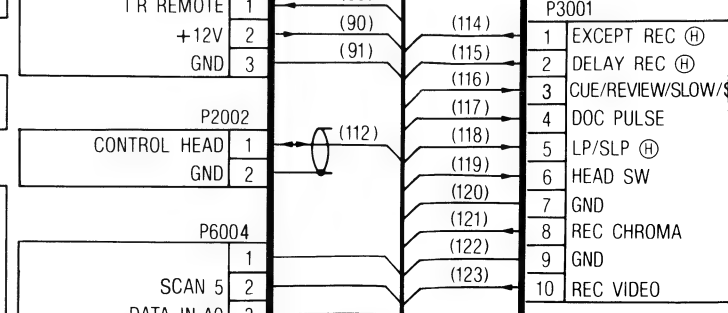
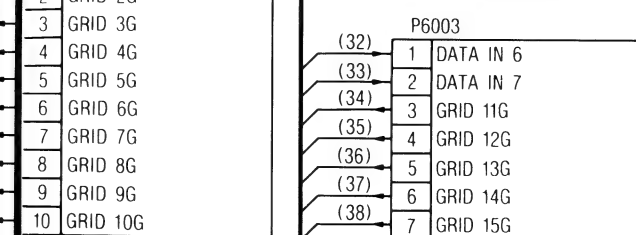
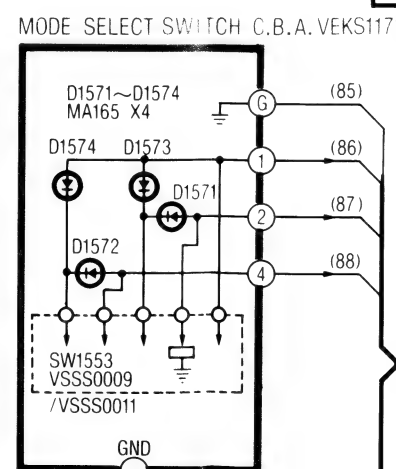
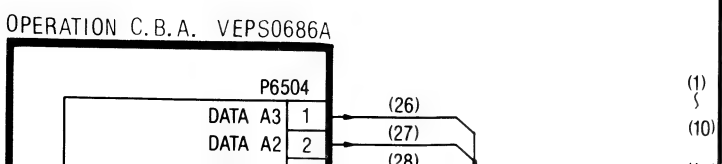
CONNECTION C.B.A.




REMOTE RECEIVING DETECTOR UNIT VEPS00241A1

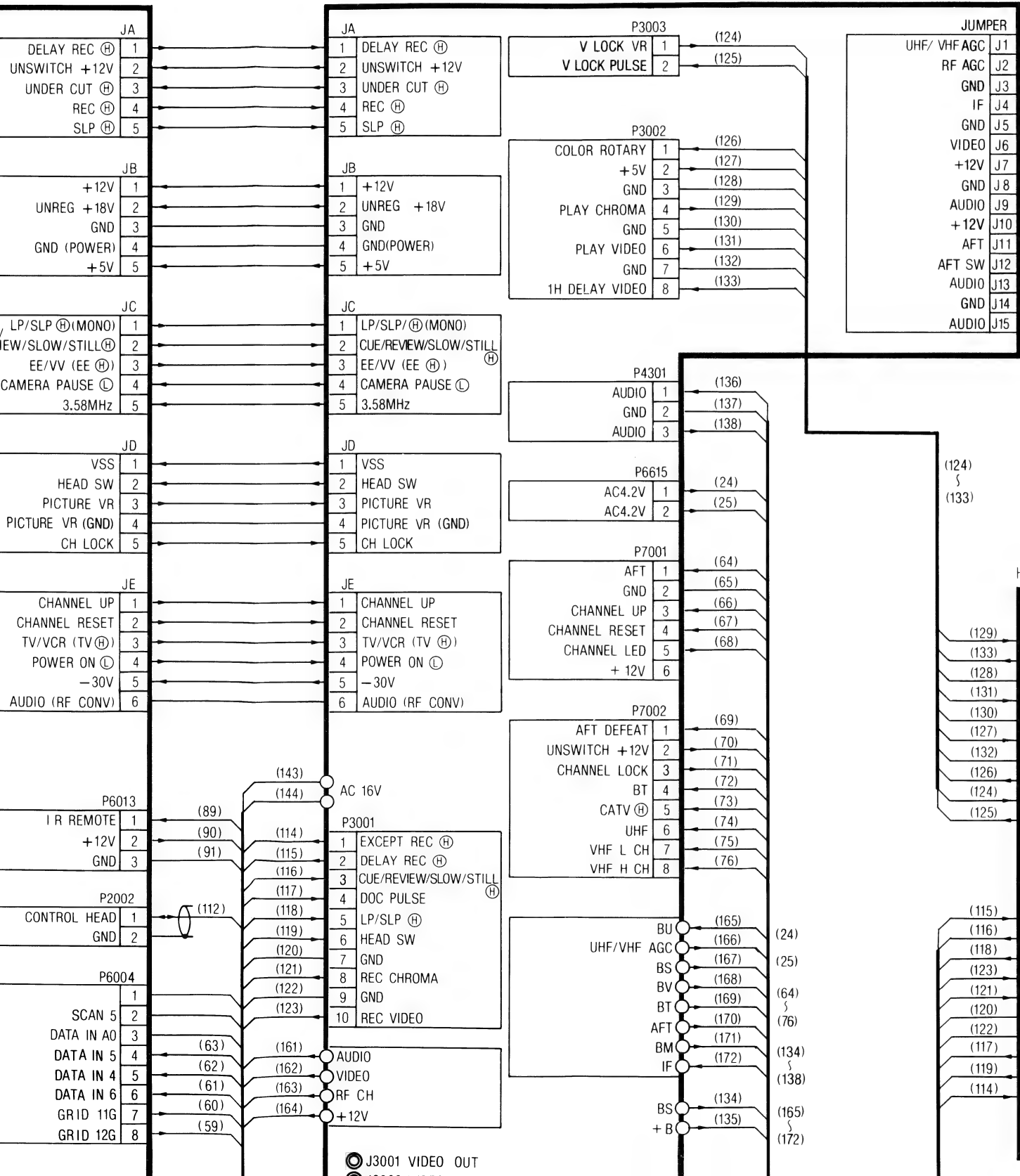


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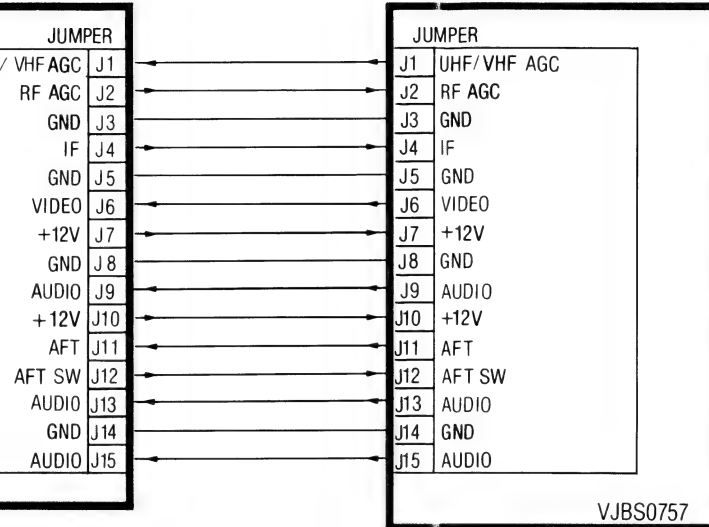


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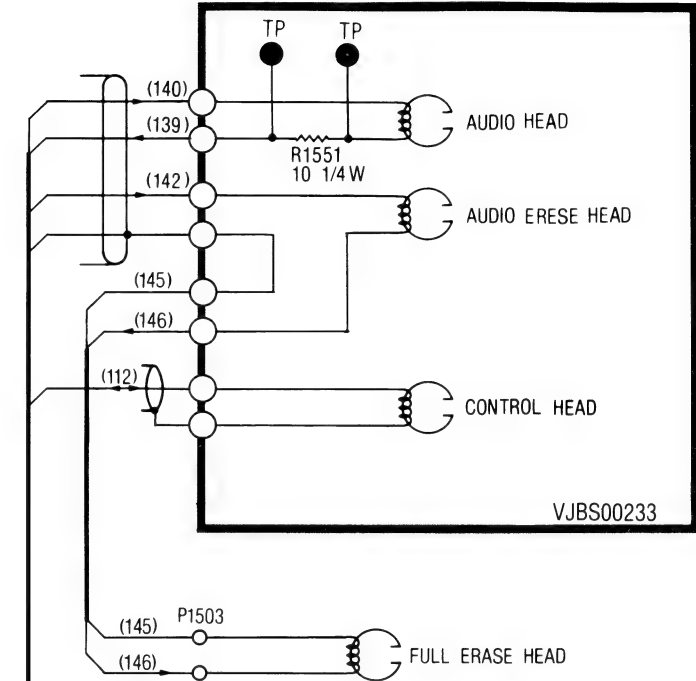
LUMINANCE, CHROMINANCE, POWER SUPPLY & TUNER CONTROL C.B.A. VEPS0328A1



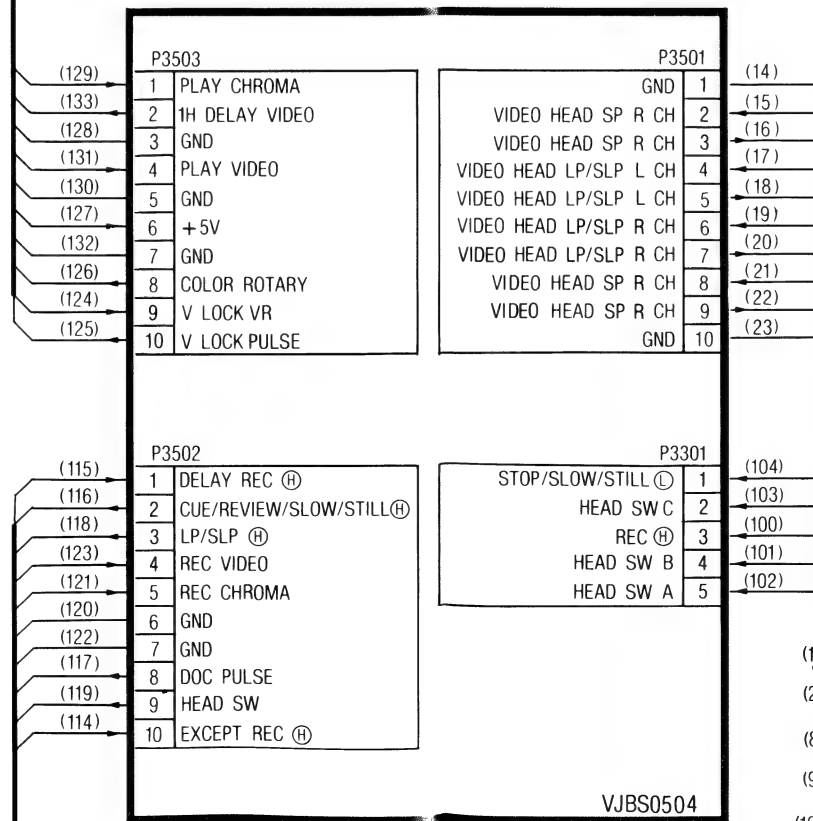
TV DEMODULATOR C.B.A. VEPS0757



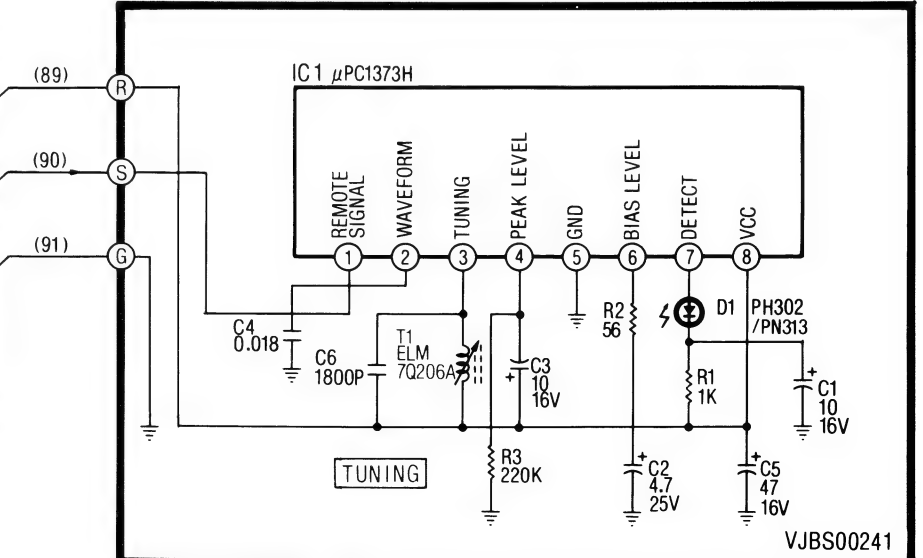
AUDIO/CONTROL HEAD C.B.A.



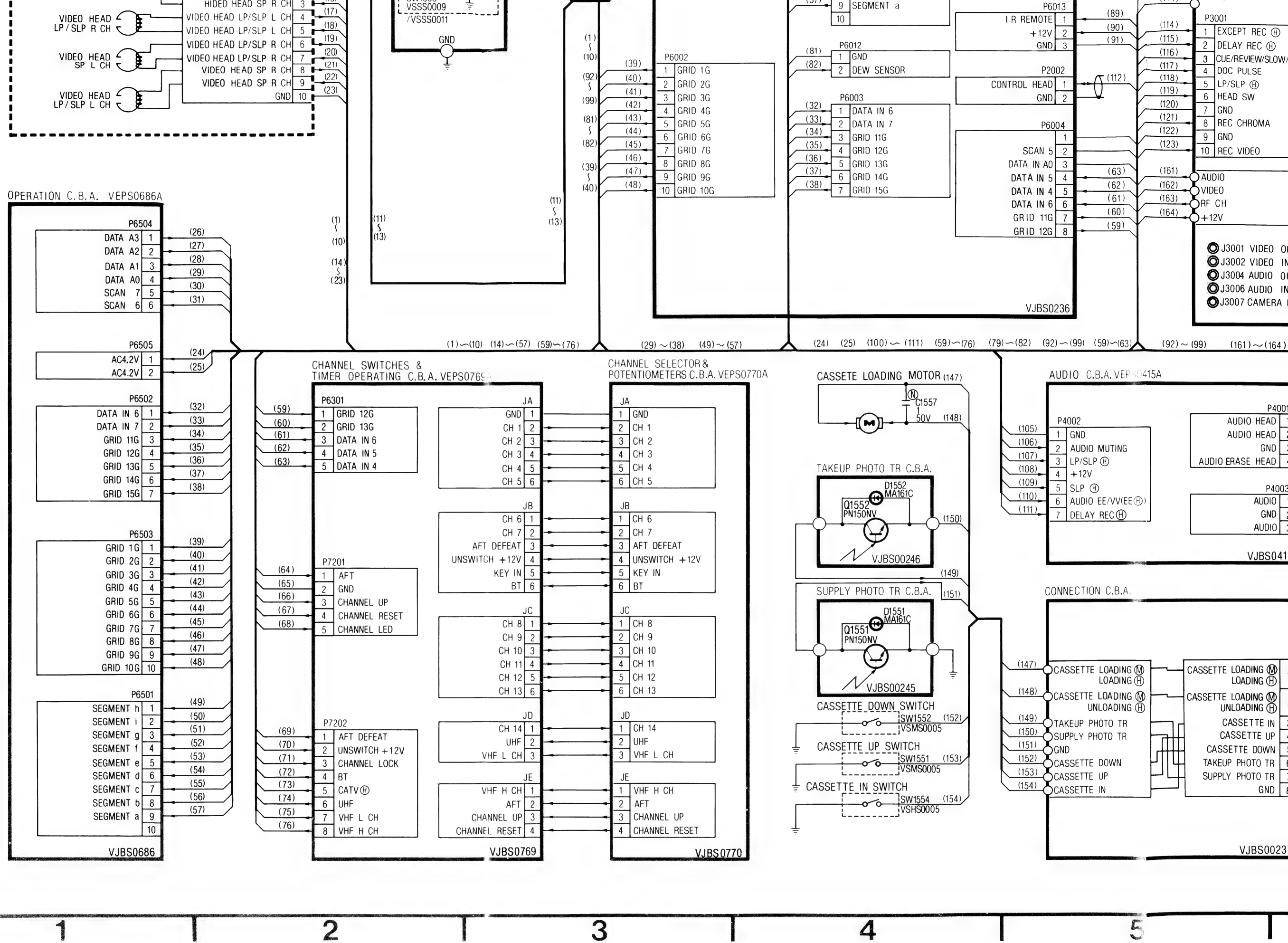
HEAD AMP C.B.A. VEPS0504A

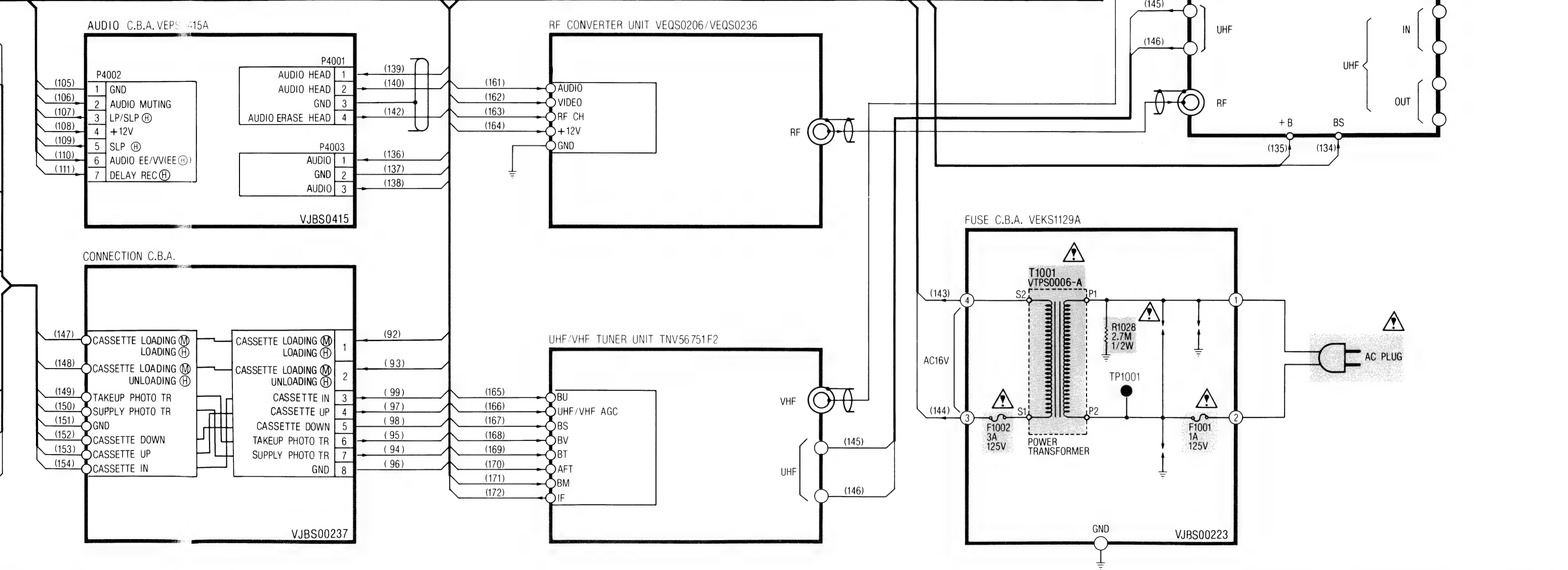
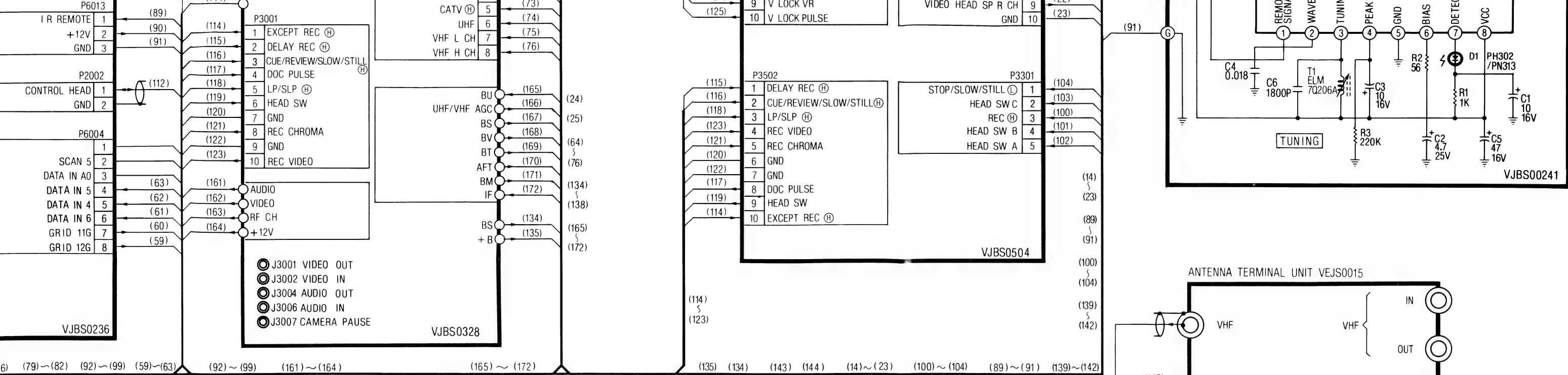


REMOTE RECEIVING DETECTOR C.B.A. VEPS00241A1



ANTENNA TERMINAL UNIT VEIS0015





6

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8

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Panasonic[®]
MATSUSHITA ELECTRIC

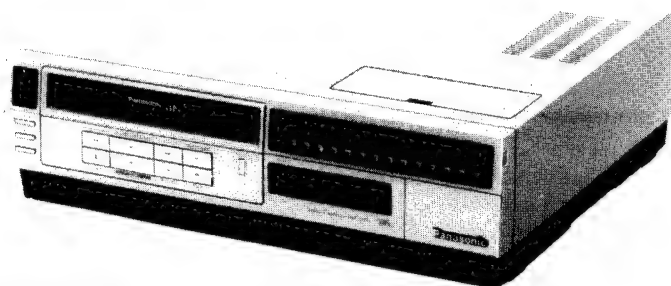
Service Manual

Vol. 5

Video Cassette Recorder

Panasonic
Omnivision VHS
PV-1520

Exploded Views Replacement Parts Lists



SPECIFICATIONS

Power Source: 120 V AC $\pm 10\%$, 60 Hz $\pm 0.5\%$
Power Consumption: Approx. 24 watts (When the Power switch is OFF, Approx. 11 watts)
Television System: EIA Standard (525 lines, 60 fields)
 NTSC color signal

Video Recording

System: 4 rotary heads helical scanning system
Luminance: FM azimuth recording
Color signal: Converted subcarrier phase shift recording

Audio Track: 1 track
Tape Format: Tape width 1/2" (12.7 mm), high density tape

Tape Speed: SP mode: 1-5/16 i.p.s. (33.35 mm/s)
 LP mode: 2 1/32 i.p.s. (16.67 mm/s)
 SLP mode: 7/16 i.p.s. (11.12 mm/s)

Record/Playback Time: 8 HRS. with 160 min. type tape used in SLP mode

FF/REW Time: Less than 6 min. with 120 min. type tape

Heads: Video: 4 rotary heads
 Audio/Control: 1 stationary head
 Erase: 1 full track erase
 1 audio track erase

Input Level: Video: VIDEO IN Jack (RCA type)
 1.0 V_{p-p}, 75 Ω unbalanced
 Audio: AUDIO IN Jack (RCA type)
 -20 dB, 50 k Ω unbalanced

TV Tuners: VHF Input: Ch2-Ch13,
 Cable Channels "A"—"W"
 75 Ω unbalanced
 UHF Input: Ch14-Ch83,
 300 Ω balanced

Output Level: Video: VIDEO OUT Jack (RCA type)
 1.0 V_{p-p}, 75 Ω unbalanced
 Audio: AUDIO OUT Jack (RCA type)
 -6 dB, 600 Ω unbalanced

RF Modulated: Ch3/Ch4 switchable,
 72 dB μ , (Open Voltage)
 75 Ω unbalanced

Video Horizontal

Resolution: Color: more than 230 lines
 B/W: more than 230 lines

Audio Frequency

Response: SP mode: 100 Hz ~ 8 kHz
 (10 dB down) LP mode: 100 Hz ~ 6 kHz
 SLP mode: 100 Hz ~ 5 kHz

Signal-to-Noise Ratio: Video: SP mode: better than 41 dB
 LP mode: better than 41 dB
 SLP mode: better than 41 dB
 (Rohde & Schwarz noise meter)
 Audio: SP mode: better than 42 dB
 LP mode: better than 40 dB
 SLP mode: better than 40 dB

Operating

Temperature: 41°F—104°F (5°C—40°C)
Operating Humidity: 10%—75%
Weight: 20.1 lbs. (9.1 kg)
Dimensions: 16-15/16" (W) \times 14-5/16" (D) \times 5-1/8" (H)
 (430 mm \times 364 mm \times 130 mm)

Accessories Supplied:

- Wireless remote control unit
- VHF matching box 75 Ω —300 Ω transformer
- 300 Ω —75 Ω transformer
- Coaxial cable with one-touch type F Connector
- Twin-lead cable
- Video cassette tape, NV-T60

Available Tapes:

1/2" VHS video cassette tapes
 NV-T160 Approx. 1073 ft. (327 mm), 160, 320, or 480 min.
 NV-T120 Approx. 810 ft. (247 mm), 120, 240, or 360 min.
 NV-T60 Approx. 417 ft. (127 m), 60, 120, or 180 min.

Weight and dimensions shown are approximate. Designs and specifications are subject to change without notice.

Panasonic®

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CONTENTS

SPECIFICATIONS	Cover
INNER PARTS LOCATION	5- 1
Top View	5- 1
Bottom View	5- 2
EXPLODED VIEWS	5- 3
1. Transport Section	5- 3
2. Moving Mechanism Section – (1)	5- 4
3. Moving Mechanism Section – (2)	5- 5
4. Cassette Up Mechanism Section	5- 6
5. Chassis Frame & Tuner Parts Section	5- 7
6. Casing Parts Section	5- 8
7. Packing Parts Section	5- 9
8. Wireless Transmitter Unit Section	5-10
REPLACEMENT PARTS LIST	5-11
MECHANICAL REPLACEMENT PARTS LIST	5-11
ELECTRICAL REPLACEMENT PARTS LIST	5-15

IMPORTANT SAFETY NOTICE

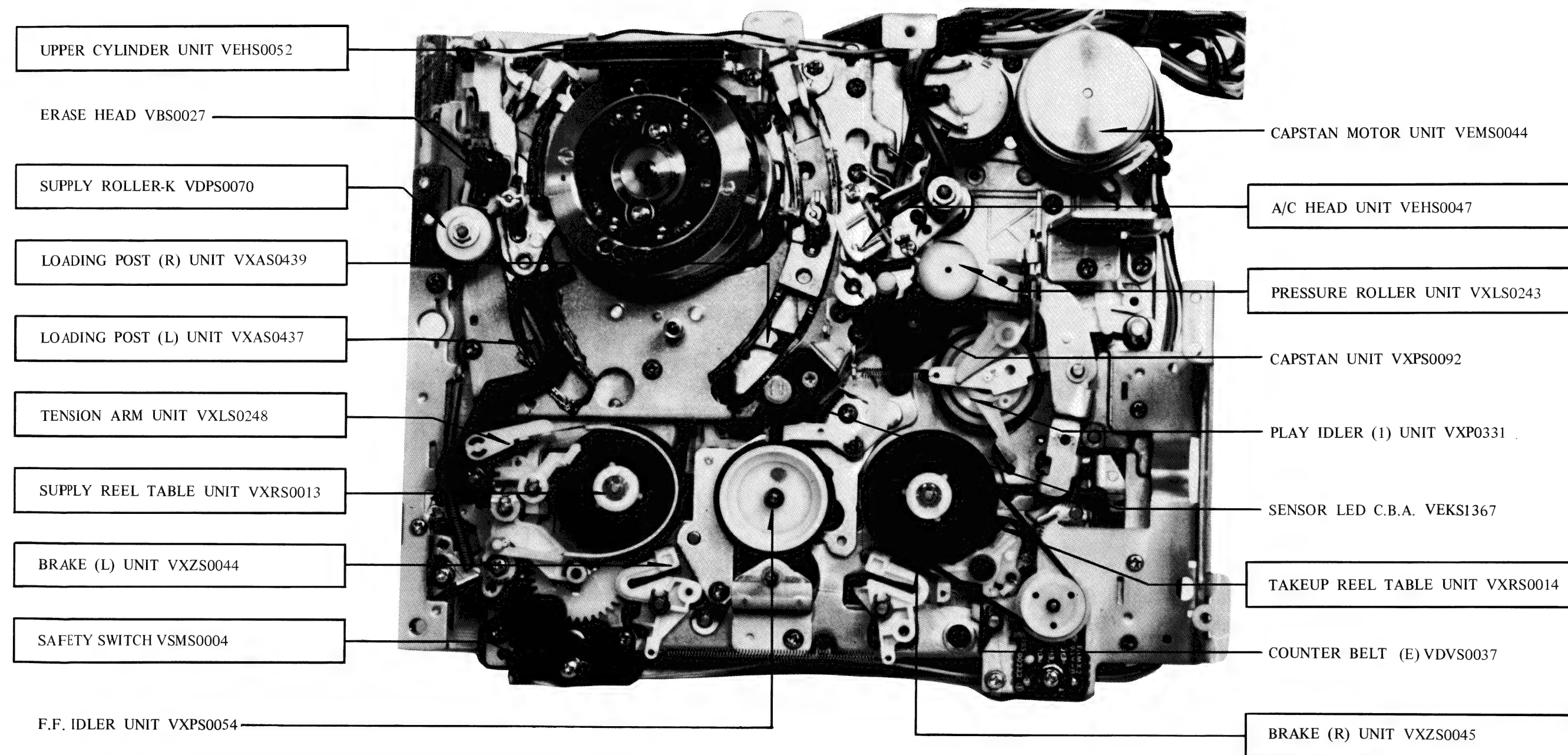
There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

INNER PARTS LOCATION

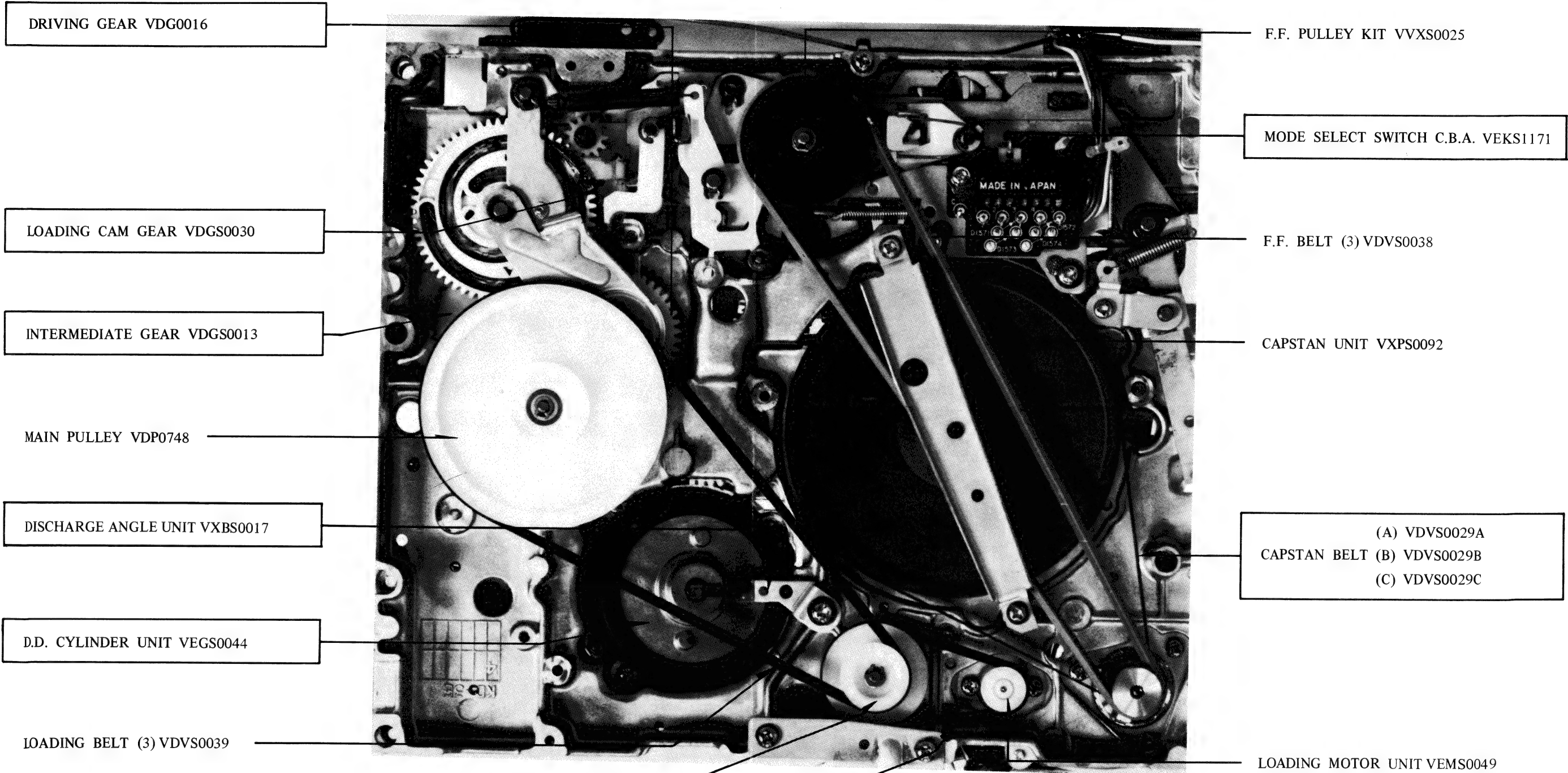
TOP VIEW

Note:

When the mechanical parts surrounded with rectangle were removed or replaced, be sure to perform necessary adjustment or confirmation procedures according to the mechanical adjustment procedures section.



BOTTOM VIEW

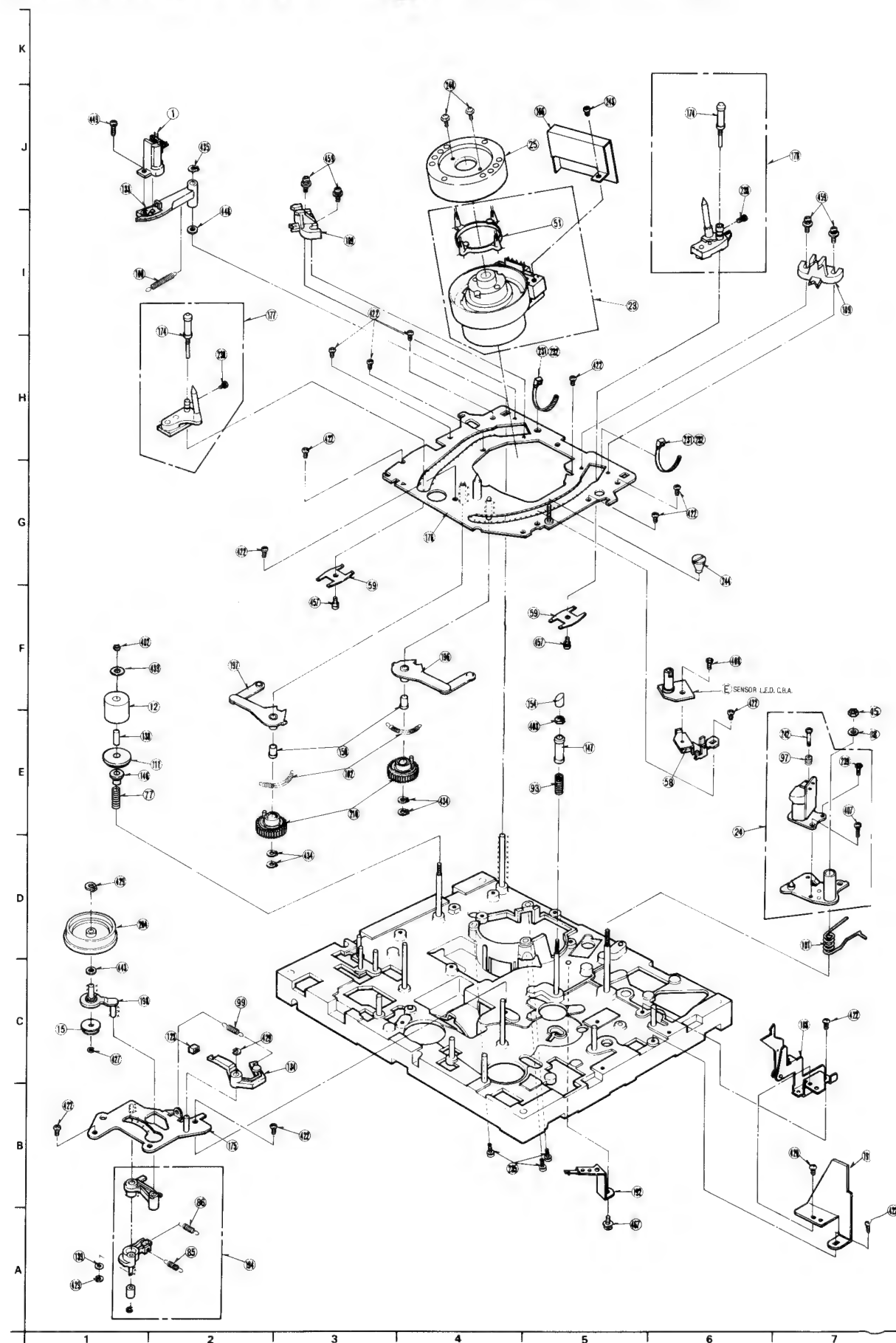


LUBRICATION POINTS

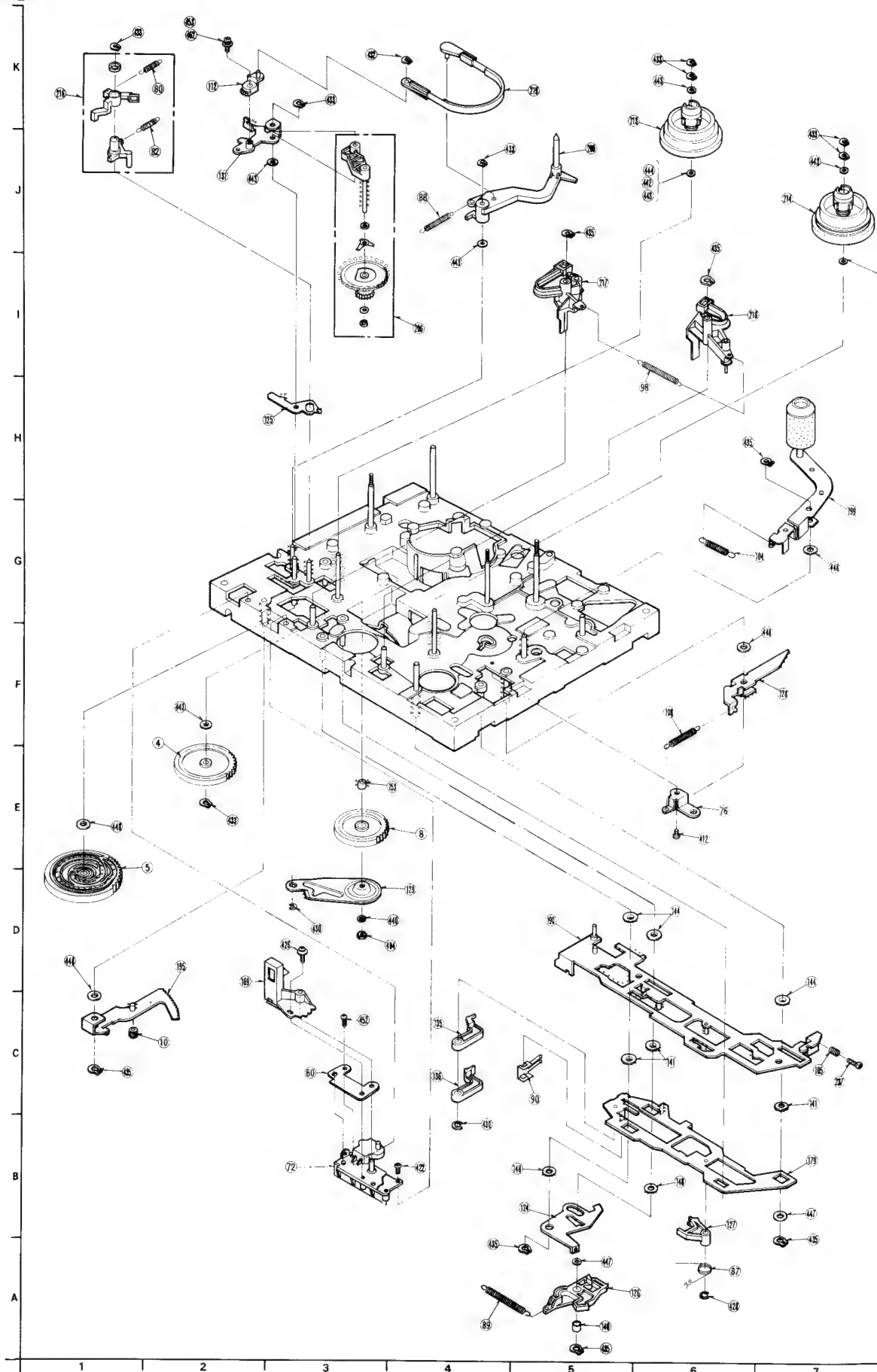
When the marked parts are replaced, apply the recommended lubricants or adhesive for better maintenance of the unit.

Marks	Kind of Lubricant	Availability	Part Number
XXX	Molytone Grease	Available From Factory	MOR265
OOO	Spindle Oil	Purchase From Local Supplier	. . . . .
ΔΔΔ	Gummed Adhesive	Purchase From Local Supplier	. . . . .

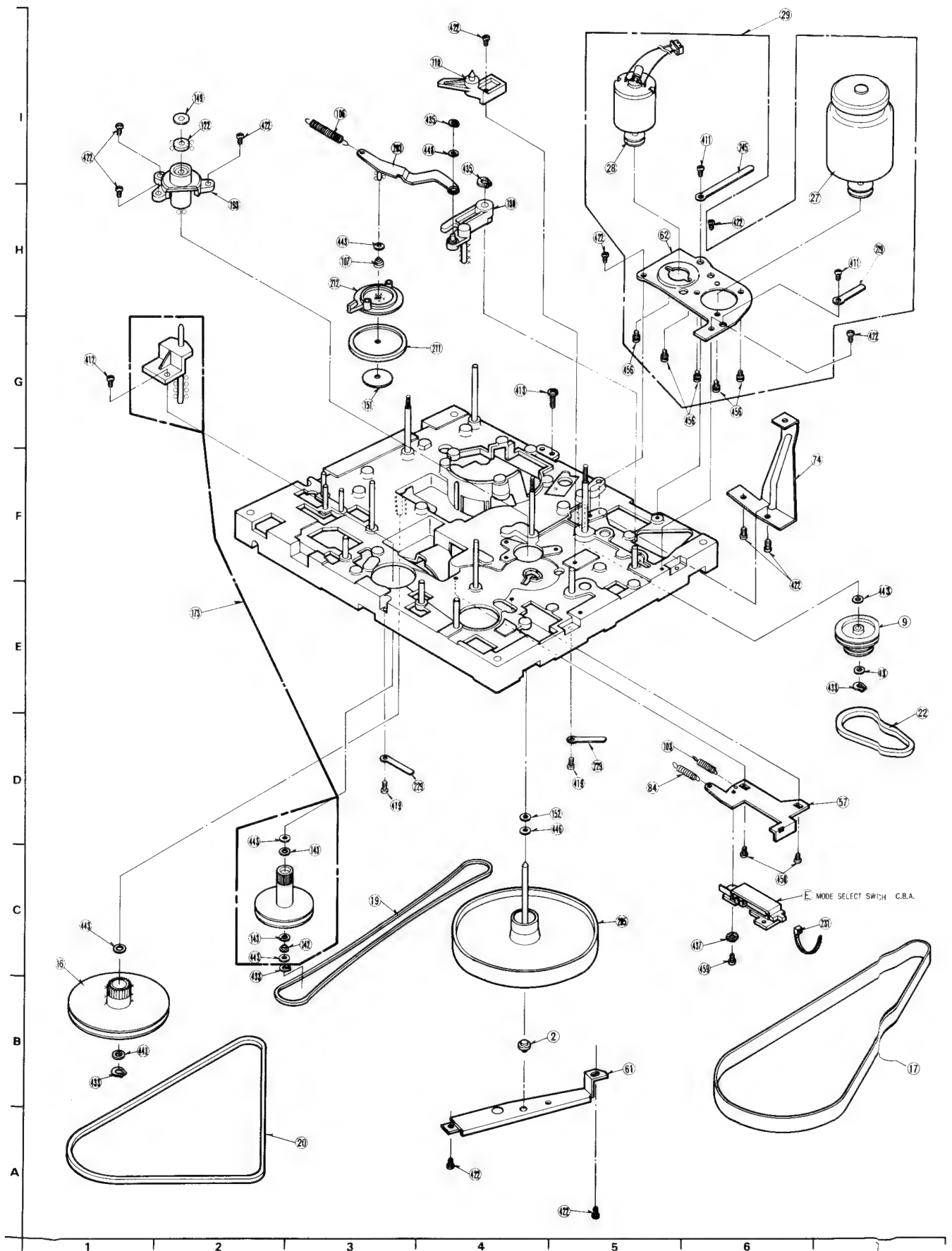
EXPLODED VIEWS **1** *Transport Section*



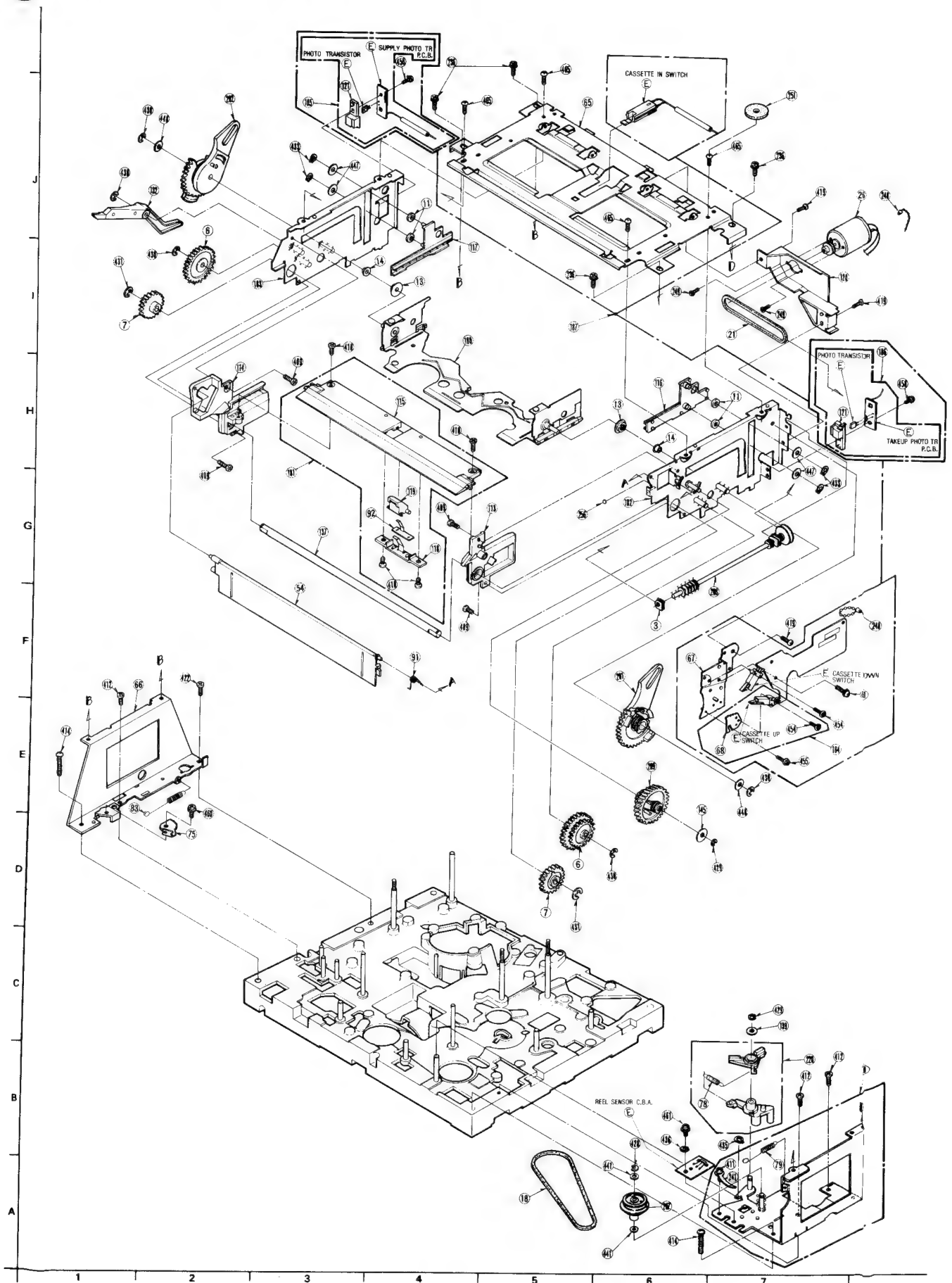
2 Moving Mechanism Section-(1)




3 Moving Mechanism Section-(2)

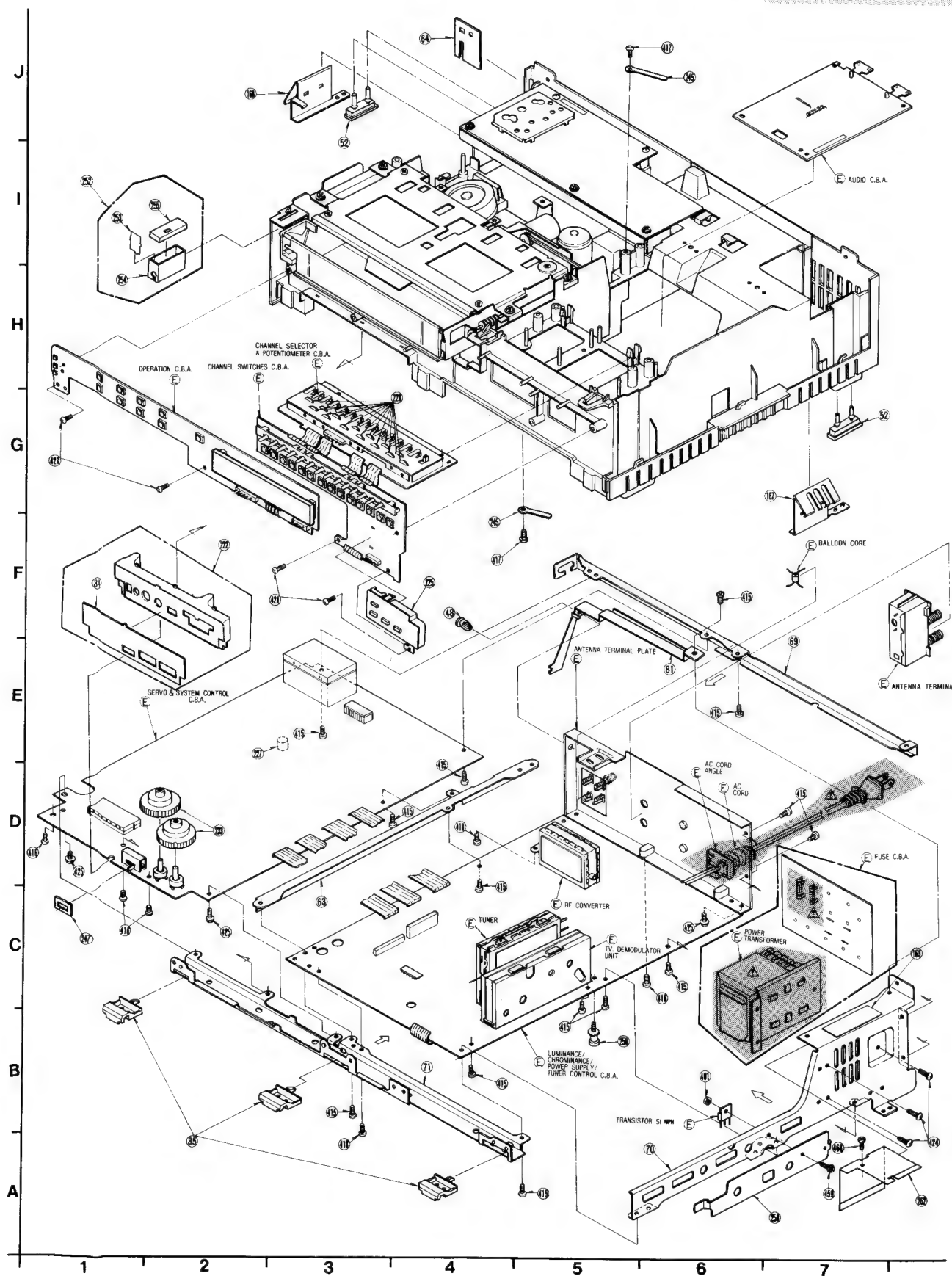


4 Cassette Up Mechanism Section

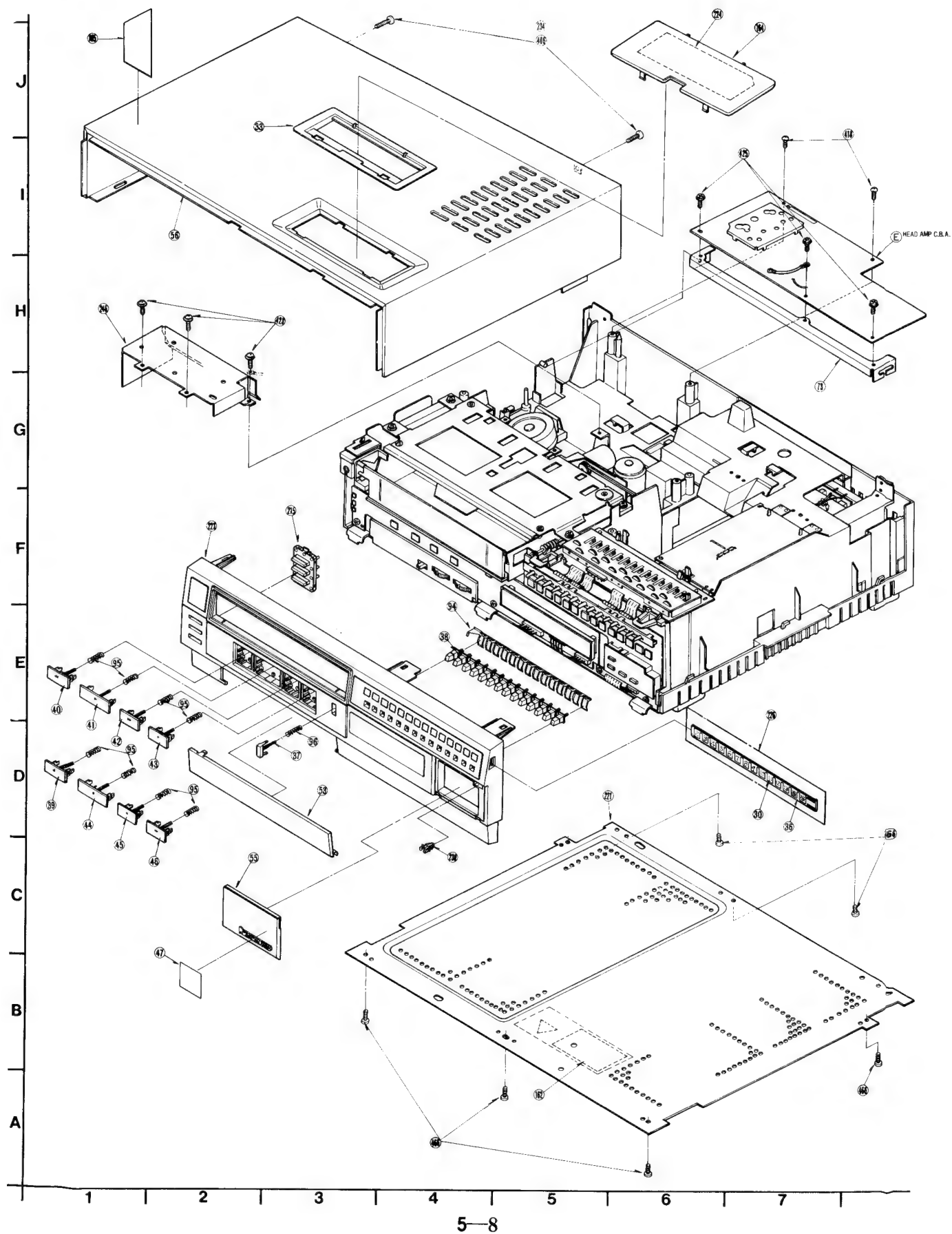


5 Chassis Frame & Tuner Parts Section

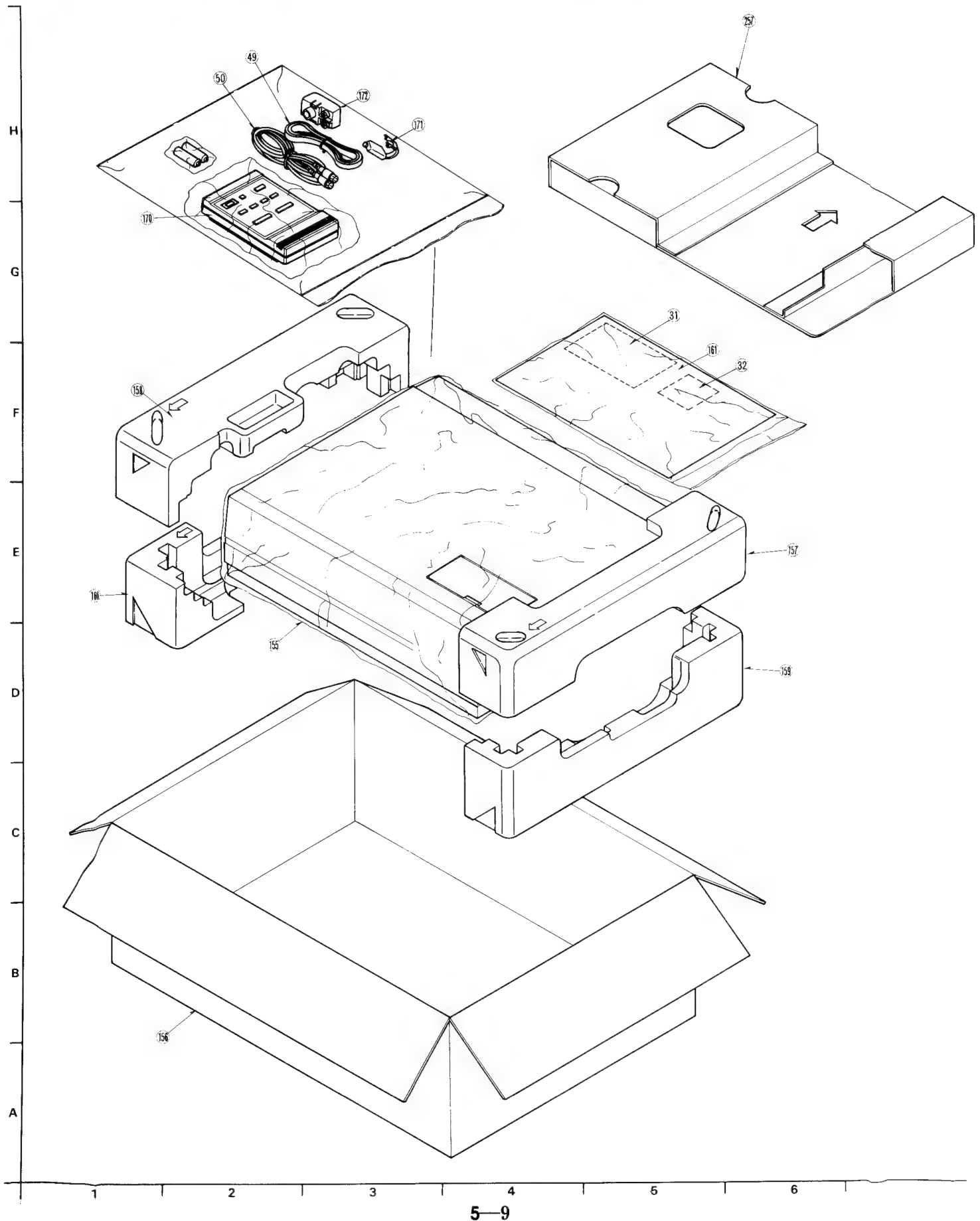
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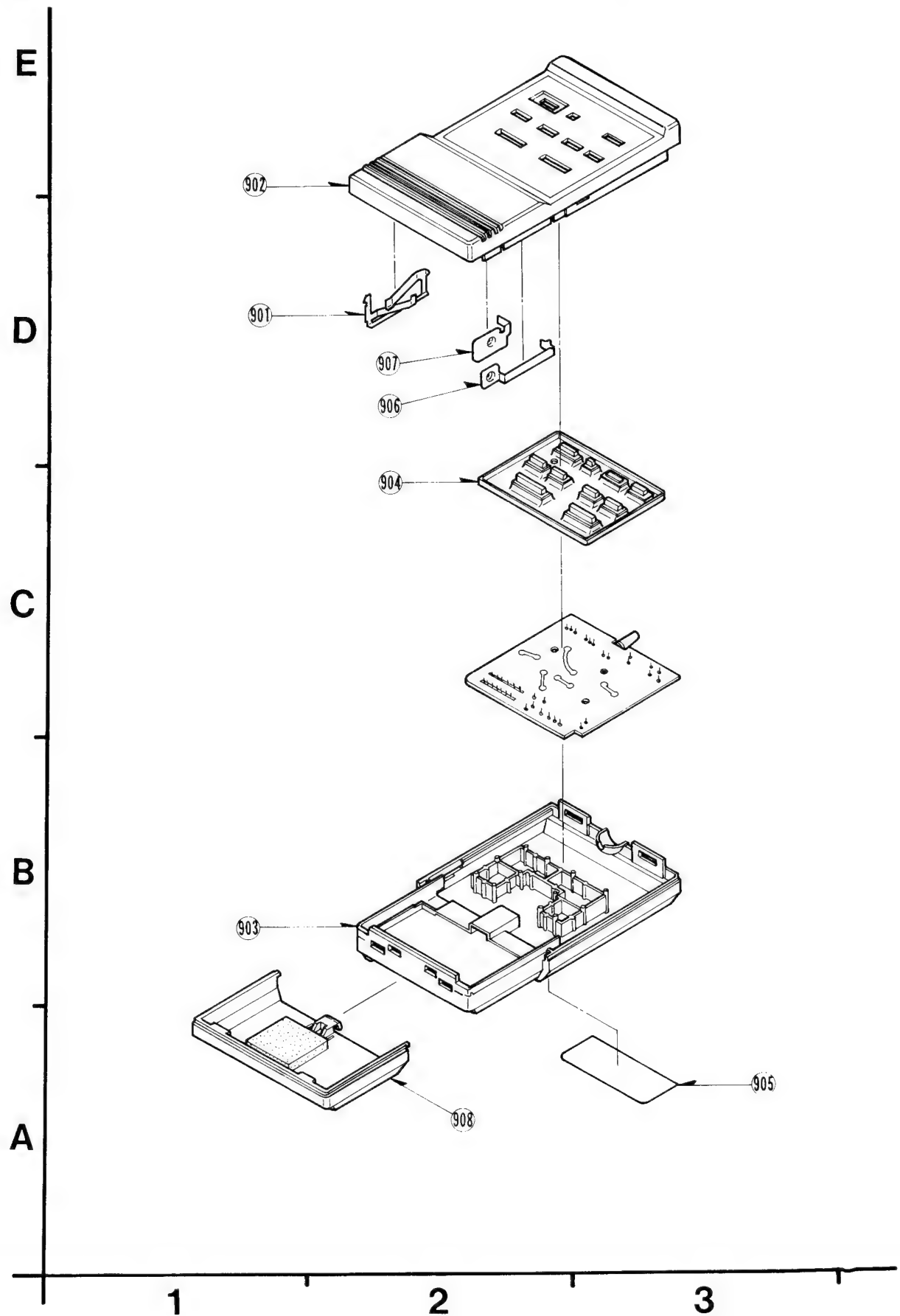
6 Casing Parts Section



7 Packing Parts & Accessories Section



8 Wireless Transmitter Unit Section



MECHANICAL REPLACEMENT PARTS LIST

Model No. PV-1520

Note: Be sure to make your orders of replacement parts according to this list.
Since all parts are available, availability column indicates no mark.

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
1	1	ERASE HEAD	1		VBS0027	
2	3	THRUST SUPPORT	1		VDBS0049	
3	4	WORM UNIT	1		VDBS0260	
4	2	INTERMEDIATE GEAR	1		VDGS0013	
5	2	LOADING CAM GEAR	1		VDGS0030	
6	4	INTERMEDIATE GEAR	2		VDGS0033	
7	4	MAIN SHAFT GEAR	2		VDGS0036	
8	2	DRIVING GEAR	1		VDG0016	
9	3	LOADING PULLEY	1		VDPS0032	
10	2	CAM FOLLOWER ROLLER	1		VDPS0034	
11	4	GUIDE ROLLER	4		VDPS0066	
12	1	SUPPLY ROLLER -K	1		VDPS0070	
13	4	CASSETTE HOLDER ROLLER	2		VDPS0077	
14	4	WIPER ROLLER	2		VDPS0078	
15	1	GUIDE ROLLER	1		VDP0746	
16	3	MAIN PULLEY	1		VDP0748	
17	3	CAPSTAN BELT -A	1		VDVS0029A	
17	3	CAPSTAN BELT -B	1		VDVS0029B	
17	3	CAPSTAN BELT -C	1		VDVS0029C	
18	4	COUNTER BELT -E	1		VDVS0037	
19	3	F.F BELT -3	1		VDVS0038	
20	3	LOADING BELT -3	1		VDVS0039	
21	4	LOADING BELT -F	1		VDVS0040	
22	3	LOADING BELT -I	1		VDV0122	
23	1	D.D CYLINDER UNIT	1		VEGS0044	
24	1	A/C HEAD UNIT	1		VEHS0047	
25	1	UPPER CYLINDER UNIT	1		VEHS0052	
26	4	CASSETTE LOADING MOTOR	1		VEMS0041	
27	3	CAPSTAN MOTOR UNIT	1		VEMS0044	
28	3	LOADING MOTOR UNIT	1		VEMS0049	
29	3	MOTOR BRACKET UNIT	1		VEMS0050	
30	6	VHF CHANNEL FILM	1		VGKS0546	
31	7	UHF CHANNEL FILM	1		VGKS0549	
32	7	CATV CHANNEL FILM	1		VGKS0569	
33	6	TUNING DOOR HOLDER	1		VGMS0039	
34	5	TRACKING V.R DECORATION	1		VGNS0625	
35	5	FRONT PANEL HOLDER PIECE	3		VGQS0224	
36	6	FILM HOLDER	1		VGQS0259	
37	6	COUNTER RESET BUTTON	1		VGUS0324	
38	6	CHANNEL SELECT BUTTON	14		VGUS0323	
39	6	OPERATION BUTTON -EJECT	1		VGUS0315	
40	6	OPERATION BUTTON-REW/SEARCH	1		VGUS0320	
41	6	OPERATION BUTTON -PLAY	1		VGUS0317	
42	6	OPERATION BUTTON -FF/SEARCH	1		VGUS0316	
43	6	OPERATION BUTTON -REC	1		VGUS0321	
44	6	OPERATION BUTTON -STOP	1		VGUS0319	
45	6	OPERATION BUTTON -PAUSE	1		VGUS0318	
46	6	OPERATION BUTTON -F. ADV	1		VGUS0322	
47	6	G4 HEAD INDICATION STICKER	1		VQLS0802	
48	5	PLASTIC STOPPER	1		VHN0017	
49	7	TWIN LEAD CONNECTOR	1		VJA0102	
50	7	F-P CABLE	1		VJA0147 or VJAS0031	
51	1	RT CONNECTION TERMINAL	1		VJRS0006	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
52	5	CUSHION	2		VKAS0011	
53	6	FRONT TERMINAL DOOR	1		VKFS0153	
54	4	BLIND PANEL	1		VKFS0173	
55	6	TIMER DOOR UNIT	1		VYPS1492	
56	6	TOP COVER	1		VKMS0047	
57	3	SWITCH HOLDER	1		VMAS0471	
58	1	SENSOR LED ANGLE	1		VMAS0485	
59	1	SHAFT HOLDER PLATE	2		VMAS0545	
60	2	GROUNDING PLATE	1		VMAS0748	
61	3	THRUST HOLDER	1		VMAS0751	
62	3	MOTOR ANGLE	1		VMAS0753	
63	5	MAIN C.B.A. ANGLE -CENTER	1		VMAS0754	
64	5	TOP COVER ANGLE	1		VMAS0756	
65	4	CASSETTE COMPARTMENT TOP PLATE	1		VMAS0760	
66	4	CASSETTE ANGLE L	1		VMAS0768	
67	4	SWITCH BRACKET	1		VMAS0771	
68	4	SWITCH ANGLE	1		VMAS0860	
69	5	MAIN C.B.A ANGLE -REAR	1		VMAS0773	
70	5	MAIN C.B.A ANGLE -RIGHT	1		VMAS0785	
71	5	MAIN C.B.A ANGLE -FRONT	1		VMAS0793	
72	2	CASSETTE HOLDER ANGLE	1		VMAS0811	
73	6	HEAD AMP C.B.A ANGLE	1		VMAS0814	
74	3	SHIELD CASE SUPPORT ANGLE	1		VMAS0840	
75	4	ADJUST HOOK	1		VMA4086	
76	2	LEVER PUSH PLATE	1		VMA4095	
77	1	SUPPLY INERTIA SPRING	1		VMBS0071	
78	4	SOFT BRAKE SPRING -1	1		VMBS0090	
79	4	SOFT BRAKE SPRING -2	1		VMBS0091	
80	2	BRAKE ARM SPRING	1		VMBS0092	
81	5	ANT TERMINAL ANGLE	1		VMAS0846	
82	2	BRAKE GUIDE SPRING	1		VMBS0093	
83	4	T.C LINK SPRING -2	1		VMBS0094	
84	3	CONTROL LEVER SPRING	1		VMBS0095	
85	1	F.F IDLER SPRING	1		VMBS0096	
86	1	F.F LEVER SPRING	1		VMBS0098	
87	2	CAM SPRING	1		VMBS0101	
88	2	TENSION SPRING	1		VMBS0107	
89	2	F.F CANCEL ARM SPRING	1		VMBS0109	
90	2	KICK LEVER SPRING	1		VMBS0127	
91	4	BLIND SPRING	1		VMBS0264	
92	4	DISCRIMINATING HOOK SPRING	1		VMBS0266	
93	1	POST SPRING -P.4	1		VMBS0288	
94	6	CHANNEL SELECT BUTTON SPRING	2		VMBS0291	
95	6	OPERATION BUTTON SPRING	1		VMBS0256	
96	6	COUNTER RESET BUTTON SPRING	1		VMBS0319	
97	1	ADJUST SPRING	1		VMBS0404	
98	2	BRAKE ARM SPRING	1		VMBS0661	
99	1	FRICTION LEVER SPRING	1		VMBS0664	
100	1	ERASE HEAD LEVER SPRING	1		VMBS0665	
101	1	A/C HEAD SPRING	1		VMBS0668	
102	1	LOADING SPRING	2		VMBS0669	
103	3	EJECT SPRING	1		VMBS0677	
104	2	PRESSURE ROLLER SPRING	1		VMBS0679	
105	2	ADJUST SPRING	1		VMBS0680	
106	3	PLAY IDLER SPRING	1		VMBS0681	
107	3	PLAY IDLER COIL SPRING	1		VMBS0683	

Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
108	2	KICK LEVER SPRING	1		VMR0749	
109	1	LOCK BASE UNIT	2		VMDS0031	
110	3	CASSETTE SUPPORT BRACKET	1		VMDS0048	
111	1	INERTIA ROLLER UPPER LIMITER	1		VMDS0063	
112	2	FASTENER HOOK	1		VMDS0162	
113	4	SIDE PLATE GUIDE -R	1		VMDS0165	
114	4	SIDE PLATE GUIDE -L	1		VMDS0166	
115	4	CASSETTE GUIDE	1		VMDS0167	
116	4	SLIDE -R	1		VMDS0168	
117	4	SLIDE -L	1		VMDS0169	
118	4	DISCRIMINATING HOOK SPRING HOLDER	1		VMDS0173	
119	4	DISCRIMINATING HOOK	1		VMDS0174	
120	4	CASSETTE LOADING MOTOR BRACKET	1		VMDS0176	
121	4	TRANSISTOR HOLDER	2		VMD0091	
122	3	OIL POOL	1		VMD0104	
123	1	FRICTION RUBBER	1		VMG0210	
124	2	F.F CONTROL LEVER	1		VMLS0118	
125	2	BRAKE CAM LEVER	1		VMLS0124	
126	2	F.F CANCEL ARM	1		VMLS0128	
127	2	KICK CAM	1		VMLS0144	
128	2	KICK LEVER	1		VMLS0148	
129	2	SECTOR GEAR HOLDER PLATE	1		VMLS0241	
130	3	PLAY IDLER LEVER	1		VMLS0280	
131	2	T.C LINK	1		VMLS0281	
132	4	CASSETTE COMPARTMENT OPENER LEVER	1		VMLS0284	
133	1	ERASE HEAD LEVER	1		VMLS0290	
134	1	FRICTION LEVER	1		VML1026	
135	2	KICK LEVER -A	1		VML1114	
136	2	KICK LEVER -B	1		VML1115	
137	4	MAIN SHAFT	1		VMSS0336	
138	1	COLLAR	1		VMXS0035	
139	1,4	ST WASHER	2		VMXS0042	
140	2	SPACER	1		VMXS0049	
141	2	SLIDE WASHER	3		VMXS0050	
142	3	SLIDE WASHER	1		VMXS0052	
143	3	WASHER	2		VMXS0098	
144	2	SLIDE WASHER F	3		VMXS0109	
145	4	CLUTCH WASHER	1		VMXS0317	
146	1	LIMITER SUPPORTER	1		VMXS0321	
147	1	POST SLEEVE -P,4	1		VMXS0322	
148	2	SLIDE WASHER -A	2		VMX0122	
149	3	OIL SEAL	1		VMX0251	
150	1	ARM SLEEVE	2		VMX0257	
151	3	IDLER WASHER	1		VMX0261	
152	3	CAPSTAN THRUST WASHER	1		VMX0265	
153	2	GEAR PIPE	1		VMX0268	
154	1	POST CAP -P,4	1		VMX0271	
155	7	POLYETHYLENE BAG	1		VPFS0029	
156	7	PACKING CASE	1		VPGS0757	
157	7	RIGHT CUSHION -TOP	1		VPNS0098	
158	7	LEFT CUSHION -TOP	1		VPNS0099	
159	7	RIGHT CUSHION -BOTTOM	1		VPNS0100	
160	7	LEFT CUSHION -BOTTOM	1		VPNS0101	
161	7	FAN BAG	1		VQFS0449	
162	6	BOTTOM CAUTION LABEL	1		VQLS0698	


Item No.	Drawing No.	Description	Pcs/ Set	Availa- bility	Part No.	Remark
163	5	FUSE CAUTION LABEL	1		VQLS0768	
164	6	TUNING EXPLANATION LABEL	1		VQLS0769	
165	6	STICKER	1		VQLS0805	
166	1	SHIELD CASE	1		VSCS0250	
167	5	BOTTOM GROUNDING PLATE -RIGHT	1		VSCS0290	
168	5	BOTTOM GROUNDING PLATE -LEFT	1		VSCS0291	
169	2	SAFETY SWITCH	1		VSMS0004	
170	7	IR WIRELESS TRANSMITTER UNIT	1		VXSQ0176	
171	7	VHF MATCHING BOX	1		VXSQ0055	
172	7	VHF ANTENNA ADAPTOR	1		VXSQ0057	
173	3	F.F PULLEY KIT	1		VVXS0025	
174	1	ROLLER POST UNIT	2		VXAS0344	
175	1	GUIDE BASE UNIT	1		VXAS0433	
176	1	LOADING BASE 1 UNIT	1		VXAS0435	
177	1	LOADING POST L UNIT	1		VXAS0437	
178	1	LOADING POST R UNIT	1		VXAS0439	
179	2	SUB ROD 1 UNIT	1		VXAS0446	
180	4	CASSETTE HOLDER UNIT	1		VXAS0547	
181	4	CASSETTE GUIDE UNIT	1		VXAS0468	
182	4	SIDE PLATE R 1 UNIT	1		VXAS0469	
183	4	SIDE PLATE L 1 UNIT	1		VXAS0471	
184	4	SWITCH ANGLE UNIT	1		VXAS0474	
185	4	SUPPLY TRANSISTOR BRACKET UNIT	1		VXAS0475	
186	4	TAKEUP TRANSISTOR BRACKET UNIT	1		VXAS0476	
187	4	CONNECTION C.B.A UNIT	1		VXAS0528	
188	1	OPENER UNIT	1		VXAS0490	
189	4	CASSETTE ANGLE R 1 UNIT	1		VXAS0496	
190	2	MAIN ROD 1 UNIT	1		VXAS0506	
191	1	DEW DETECTOR ANGLE	1		VXAS0526	
192	1	DISCHARGE ANGLE UNIT	1		VXBS0017	
193	3	CAPSTAN HOLDER UNIT	1		VXDS0011	
194	1	F.F IDLER LEVER UNIT	1		VXLS0112	
195	2	SECTOR GEAR UNIT	1		VXLS0132	
196	1	LOADING ARM R UNIT	1		VXLS0200	
197	1	LOADING ARM L UNIT	1		VXLS0201	
198	1	F.F IDLER ARM 1 UNIT	1		VXLS0239	
199	2	PRESSURE ROLLER UNIT	1		VXLS0243	
200	2	TENSION ARM UNIT	1		VXLS0248	
201	4	WIPER GEAR R UNIT	1		VXLS0254	
202	4	WIPER GEAR L UNIT	1		VXLS0255	
203	3	PLAY IDLER LEVER	1		VXLO747	
204	1	F.F IDLER UNIT	1		VXPS0054	
205	3	CAPSTAN UNIT	1		VXPS0092	
206	2	REWIND GEAR UNIT	1		VXPS0108	
207	4	COUNTER PULLEY UNIT	1		VXPS0110	
208	4	WORM SHAFT UNIT	1		VXPS0112	
209	4	WORM WHEEL UNIT	1		VXPS0113	
210	1	LOADING GEAR UNIT	2		VXP0325	
211	3	PLAY IDLER 1 UNIT	1		VXP0331	
212	3	PAUSE BRAKE PULLEY UNIT	1		VXP0332	
213	2	SUPPLY REEL TABLE UNIT	1		VXRS0013	
214	2	TAKEUP REEL TABLE UNIT	1		VXRS0014	
215	6	BUTTON BRACKET UNIT	1		VXUS0043	
216	2	SOFT BRAKE UNIT	1		VXZS0014	

Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
217	2	BRAKE L UNIT	1		VXZS0044	
218	2	BRAKE R UNIT	1		VXZS0045	
219	2	TENSION BAND UNIT	1		VXZS0047	
220	4	SOFT BRAKE T UNIT	1		VXZS0050	
221	6	BOTTOM PANEL UNIT	1		VYFS0039	
222	5	TRACKING V.R PANEL UNIT	1		VYFS0042	
223	6	FRONT PANEL 1 UNIT	1		VYPS1507	
224	6	TUNING DOOR UNIT	1		VYPS1510	
225	5	TIMER BUTTON BRACKET UNIT	1		VYPS1647	
226	6	FILM HOLDER UNIT	1		VYQS0025	
227	5	CUSHION (C)	1		VMGS0033	
228	5	TUNING V.R KNOB	14		NBE540K	
229	3	CLAMPER	3		SCF-2011S	
230	6	DOOR CLAMPER	1		TKK769906	
231	1,3	FASTENER	3		TYB-23M	
232	1	FASTENER	2		T18S	
233	5	TRACKING KNOB	2		VGTS0068	
234	6	SCREW	2		VHDS0011	
235	1	SCREW	3		VHDS0016	
236	4	SCREW	4		VHDS0017	
237	2	SCREW	1		VHDS0022	
238	1	LOCK SCREW	2		VHDS0024	
239	1	A/C HEAD SCREW	1		VHDS0025 or VHDS0035	
240	1	SCREW WITH WASHER	2		VHDS0032	
241	4	CLAMPER	1		PEC-034-0	
242	1	ADJUST SCREW	1		VHDO054	
243	1	SCREW	1		VHDS0031	
244	1	ADJUST NUT	1		VHNS0019	
245	3,5	CLAMPER	3		VJR3	
246	6	SHIELD CASE	1		VMA0843	
247	5	SWITCH COVER	1		VMFS0066	
248	4	FASTENER	2		WZBV1	
249	4	SCREW 3 x 4	2		VHDS0036	
250	5	SCREW	1		VHDS0006	
251	4	CUSHION	1		TMM1551	
252	5	IR WIRELESS RECEIVING DETECTOR UNIT	1		VEFS00241A1	
253		FILTER PLATE	1		VGQS0294	
254		SHIELD CASE (BOTTOM)	1		VSCS0309	
255		SHIELD CASE (TOP)	1		VSCS0310	
256	4	CUSHION	1		VMTS0011	
257	7	CASSETTE TAPE ACCESSORY CASE	1		VPNS0108	
258	5	HEAT SINK PLATE	1		VSCS0358	
259						
260						
261						
262	5	POWER TRANSFORMER SHIELD COVER	1		VXAS0554	









Item No.	Drawing No.	Description	Pcs/ Set	Availability	Part No.	Remark
401	5	M3 NUT	1		XNG3	
402	1	M3 NUT	1		XNG3E	
403	1	M3 NUT	1		XNG3EZU	
404	2	M3 NUT	1		XNG3F	
405	1	M4 NUT	1		XNG4	
406	6	BIND SCREW 4 x 12	2		XS84+12KS	
407	1	SCREW 3 x 8	1		XSN3D8FYS	
408	1	SCREW 2.6 x 6	1		XSS26+6S	
409	4	TAPPING SCREW 3 x 6	4		XTB3+6FFZ	
410	4	TAPPING SCREW 3 x 8	4		XTB3+8GFZ	
411	3,4	TAPPING SCREW 3 x 4	3		XTN3+4F	
412	2,3,4	TAPPING SCREW 3 x 8	5		XTN3+8F	
413	3	TAPPING SCREW 4 x 20	1		XTN4+20A	
414	4	TAPPING SCREW 4 x 35	2		XTN4+35A	
415	5	TAPPING SCREW 3 x 10	14		XTN3+10	
416	5	TAPPING SCREW 3 x 10	4		XTV3+10B	
417	5	TAPPING SCREW 3 x 12	2		XTV3+12B	
418	5,6	TAPPING SCREW 3 x 12	4		XTV3+12B	
419	3,4	TAPPING SCREW 3 x 6	5		XTV3+6F	
420	1	TAPPING SCREW 3 x 6	1		XTV3+6FS	
421	5	TAPPING SCREW 3 x 8	4		XTV3+8	
422	1,2,3,4	TAPPING SCREW 3 x 8	26		XTV3+8F	
423	6	TAPPING SCREW 3 x 8	3		XTV3+8F8S	
424	5	TAPPING SCREW 4 x 8	3		XTV4+8FS	
425	5,6	TAPPING SCREW 3 x 10	6		XTW3+10L	
426		SCREW WITH WASHER 3 x 10	1		XYA3+FJ10	
427	1	RETAINING RING E-TYPE 1.5	1		XUC15FP	
428	2,4	RETAINING RING E-TYPE 2	2		XUC2FP	
429	1,4	RETAINING RING E-TYPE 2.5	5		XUC25FP	
430	2,4	RETAINING RING E-TYPE 3	7		XUC3FP	
431	4	RETAINING RING E-TYPE 4	2		XUC4FP	
432	2	RETAINING RING C-TYPE 3	1		XUEV3FP	
433	2,3,4	RETAINING RING C-TYPE 3	15		XUEV3VW	
434	1	RETAINING RING C-TYPE 4	4		XUEV4FP	
435	1,2,3,4	RETAINING RING C-TYPE 4	11		XUEV4VW	
436	4	WASHER 3	1		XWC3B	
437	3	TOOTHED LOCK WASHER 3	1		XWC3BF	
438	1	WASHER 4	1		XWE4E8	
439	1	WASHER 3	1		VNW60002	
440	2	WASHER 3	1		XWS3B	
441	4	POLY SLIDER WASHER 2	2		XWXV2D	
442	2	POLY SLIDER WASHER 3	1		XWXV3A6	(t = 0.25)
443	1,2,3	POLY SLIDER WASHER 3	14		XWXV3D54	(t = 0.5)
444	2	POLY SLIDER WASHER 3	1		XWXV3Z54	(t = 0.13)
445	2	POLY SLIDER WASHER 3	1		XMXV3Z9	(t = 0.13)
446	3	POLY SLIDER WASHER 3	1		XMXV3D6	
447	2,4	POLY SLIDER WASHER 4	6		XWXV4D11	
448	1,2,3,4	POLY SLIDER WASHER 4	8		XMXV4D9	
449	1	SCREW WITH WASHER 2.6 x 8	1		XYC26+CJ1	
450	3	SCREW WITH WASHER 3 x 8	2		XYC3+BF8	
451	4	SCREW WITH WASHER 3 x 6	1		XYE3+EF6	
452	2	SCREW WITH WASHER 3 x 10	1		XYE3+FF10S	
453	2	SCREW WITH WASHER 3 x 8	1		XYNV3+MB	
454	4	SCREW WITH WASHER 2 x 10	2		XYN2+F10	
455	4	SCREW WITH WASHER 2.6 x 8	1		XYN26+AF1	
456	3	SCREW WITH WASHER 3 x 4	5		XYN3+C4	
457	1	SCREW WITH WASHER 3 x 4	2		XYN3+C4S	
458	4	SCREW WITH WASHER 3 x 10	2		XYN3+E10	
459	1,3,5	SCREW WITH WASHER 3 x 10	6		XYN3+F10	

ELECTRICAL REPLACEMENT PARTS LIST

Model No. PV-1520

<p>Note:</p> <p>1. Be sure to make your orders of replacement parts according to this list.</p> <p>2. IMPORTANT SAFETY NOTICE</p> <p>Components identified by the sign  have special characteristics important for safety. When replacing any of these components, use only the specified parts.</p> <p>3. Unless otherwise specified:</p> <p>All resistors are in OHMS (Ω), 1/4W, $\pm 5\%$ carbon, K=1,000Ω, M=1,000KΩ.</p> <p>All capacitors are in MICROFARADS (μF), $\pm 10\%$ P=μF.</p> <p>All coils are in MICROHENRIES (μH), m=10μ, $\pm 10\%$.</p> <p>4. C.B.A: Circuit Board Assembly.</p> <p>5. P.C.B: Print Circuit Board.</p>				
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Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		PRINTED CIRCUIT BOARD ASSEMBLY		
	VEPS0328A1	LUMINANCE \ CHROMINANCE \ POWER SUPPLY TUNER CONTROL C.B.A.	1	
	VEPS0236A1	SERVO & SYSTEM CONTROL C.B.A.	1	
	VEPS0504A	HEAD AMP C.B.A.	1	
	VEPS0770A	CHANNEL SELECTOR & POTENTIOMETER C.B.A.	1	
	VEPS0686A	OPERATION C.B.A.	1	
	VEPS0769A	CHANNEL SWITCHES C.B.A.	1	
	VEQS0240	TV DEMODULATOR UNIT	1	
	VEPS0415A	AUDIO C.B.A.	1	
	VEKS1129A	FUSE C.B.A.	1	
	VEKS1171	MODE SELECT SWITCH C.B.A.	1	
	VEKS1367	SENSOR LED C.B.A.	1	
	VEKS1119	REEL SENSOR C.B.A.	1	
		LUMINANCE \ CHROMINANCE \ POWER SUPPLY \ TUNER CONTROL C.B.A.		
		Integrated Circuits		
IC3001	AN6306		1	
IC3002	AN6337		1	
IC3003	AN6328		1	
IC7001	AN5070		1	
IC8001	AN6366		1	
IC8002	MN6163		1	
		Transistors		
Q1002	2SA950(Y) or 2SB643(Q,R,S)		1	
Q1003	2SD636(Q,R,S)		1	
Q1004	2SB976(Q,R)		1	
Q1005-1007	2SD636(Q,R,S)		3	
Q1008	2SD1475(Q)		1	
Q1009	2SB976(Q,R)		1	
Q1011	2SD636(Q,R,S)		1	
Q1012	2SB643(Q,R) or 2SA950(Y)		1	
Q3001-3003	2SB641(Q,R,S)		3	
Q3009	2SB641(Q,R,S)		1	
Q3011-3016	2SD636(Q,R,S)		6	
Q7001,7002	2SD636(Q,R)		2	
Q7006,7007	2SB642(Q,R)		2	
Q7008	2SD637(C,R)		1	
Q7009	2SB644(Q,R)		1	
Q7012	2SD636(R,S)		1	
Q7013,7014	2SD636(Q,R)		2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
Q7015	2SB643(Q,R,S)		1	
Q7016	2SD636(R,S)		1	
Q7017,7018	2SD636(Q,R)		2	
Q8001,8002	2SD636(Q,R,S)		2	
Q8003	2SB643(Q,R,S)		1	
Q8004-8006	2SD636(Q,R,S)		3	
Q8007	2SB641(Q,R,S)		1	
Q8008	2SD636(Q,R,S)		1	
Q8010	2SD636(Q,R,S)		1	
		Diodes		
D1001-1004	 ERG04-02 or Zener  ERG04-02E3		4	
D1005	MA4068L	Zener	1	
D1006	MA165		1	
D1007	 ERB43-04 or  ERB43-04G		1	
D1008	 ERA81-004 or  ERA81-004G		1	
D1009,1010	MA165		2	
D1011	 ERB43-04 or  ERB43-04G		1	
D1012	MA165		1	
D1013	MA4051M	Zener	1	
D1014,1015	MA165		2	
D3001	MA165 or 1SS119		1	
D3003	MA1030 or Zener RD3.0EB		1	
D3004	EQA02-10(B) or Zener EQA02-10(C) or MA1110 or RD11EB		1	
D3005-3007	MA165 or 1SS119		3	
D3015	MA165 or 1SS119		1	
D3016	1SS86 or 1SS96		1	
D3019	MA165 or 1SS119		1	
D3020,3021	RD13EB	Zener	2	
D3022	MA4062	Zener	1	
D4305-4308	RD13EB	Zener	4	
D6001	EQA02-06(A) or Zener EQA02-06(B) or MA1056 or RD5.6EB		1	
D7002	MA166		1	
D7003	MA165 or 1SS119		1	
D7004	MA166		1	
D7005	MA166C		1	
D7006	EQA02-05(D) or Zener RD5.1EB2		1	
D7007,7008	MA165 or 1SS119		2	
D7010-7013	RD15EB or Zener EQA02-14		4	
D7014	MA165 or 1SS119		1	
D8001,8002	MA165 or 1SS119		2	
D8006,8007	MA165 or 1SS119		2	
		Resistors		
R1001	ERDS2TJ561		560 1	
R1002,1003	ERDS2TJ472		4.7K 2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R1004	ERDS2TJ561		560	1
R1005	ERDS2TJ473		47K	1
R1006	ERDS2TJ103		10K	1
R1007	ERDS1FJ1R0	1/2W	1	1
R1008	ERDS2TJ103		10K	1
R1009	ERDS2TJ681		680	1
R1010	ERDS1FJ1R0	1/2W	1	1
R1011	ERDS2TJ473		47K	1
R1012	ERDS2TJ103		10K	1
R1013-1015	ERDS2TJ104		100K	3
R1016	ERDS2TJ103		10K	1
R1017	ERDS2TJ473		47K	1
R1018	ERDS2TJ101		100	1
R1019, 1020	ERDS2TJ3R3		3.3	2
R1021	ERDS2TJ102		1K	1
R1022	ERDS2TJ101		100	1
R1023, 1024	ERDS2TJ473		47K	2
R1025	ERCL5J221	Metal Oxide 1W	220	1
R1026	ERDS2TJ562		5.6K	1
R1027	ERDS2TJ220		22	1
R1029	ERDS2TJ330		33	1
R1030	ERDS2TJ562		5.6K	1
R1031	ERDS2TJ472		4.7	1
R3001	ERDS2TJ562		5.6K	1
R3002, 3003	ERDS2TJ102		1K	2
R3004	ERDS2TJ821		820	1
R3005	ERDS2TJ682		6.8K	1
R3006	ERDS2TJ332		3.3K	1
R3007	ERDS2TJ562		5.6K	1
R3008	ERDS2TJ222		2.2K	1
R3009	ERDS2TJ392		3.9K	1
R3010	ERDS2TJ472		4.7K	1
R3011	ERDS2TJ272		2.7K	1
R3012, 3013	ERDS2TJ333		33K	2
R3014	ERDS2TJ182		1.8K	1
R3015	ERDS2TJ103		10K	1
R3016	EVNE4AA00B14	Variable	10K	1
R3017	EVNE4AA00B24	Variable	20K	1
R3018	EVNE4AA00B14	Variable	10K	1
R3019	ERDS2TJ822		8.2K	1
R3020	ERDS2TJ473		47K	1
R3021	ERDS2TJ471		470	1
R3022	ERDS2TJ823		82K	1
R3023	ERDS2TJ223		22K	1
R3024	ERDS2TJ224		220K	1
R3025, 3026	ERDS2TJ561		560	2
R3027	EVNE4AA00B24	Variable	20K	1
R3028	ERDS2TJ102		1K	1
R3029	ERDS2TJ563		56K	1
R3030	EVNE4AA00B24	Variable	20K	1
R3031	ERDS2TJ560		56	1
R3032	ERDS2TJ122		1.2K	1
R3033	ERDS2TJ101		100	1
R3034	ERDS2TJ682		6.8K	1
R3035	ERDS2TJ680		68	1
R3036	ERDS2TJ102		1K	1
R3037	EVNE4AA00B23	Variable	2K	1
R3038	ERDS2TJ223		22K	1
R3039	ERDS2TJ122		1.2K	1
R3042	ERDS2TJ182		1.8K	1
R3043	EVNE4AA00B23	Variable	2K	1
R3044, 3045	ERDS2TJ561		560	2
R3046	ERDS2TJ563		56K	1
R3047	ERDS2TJ103		10K	1
R3048	ERDS2TJ102		1K	1
R3049	ERDS2TJ681		680	1
R3060	ERDS2TJ122		1.2K	1
R3061	ERDS2TJ153		15K	1
R3062	ERDS2TJ102		1K	1
R3063	ERDS2TJ822		8.2K	1

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R3064	ERDS2TJ471		470	1
R3065	ERDS2TJ561		560	1
R3071	ERDS2TJ564		560K	1
R3072	ERDS2TJ681		680	1
R3073	ERDS2TJ100		10	1
R3074	ERDS2TJ222		2.2K	1
R3075	ERDS2TJ122		1.2K	1
R3076	ERDS2TJ103		10K	1
R3077	ERDS2TJ182		1.8K	1
R3079	ERDS2TJ223		22K	1
R3080	EVNE4AA00B15	Variable	100K	1
R3084	ERDS2TJ122		1.2K	1
R3085	ERDS2TJ152		1.5K	1
R3086	ERDS2TJ122		1.2K	1
R3087, 3088	ERDS2TJ103		10K	2
R3090	ERDS1TJ750	1/2W	75	1
R3091	ERDS2TJ102		1K	1
R3094	ERDS2TJ820		82	1
R3098	ERDS2TJ562		5.6K	1
R3099	ERDS2TJ102		1K	1
R3101	ERDS2TJ332		3.3K	1
R3102	ERDS2TJ821		820	1
R3103	ERDS2TJ100		10	1
R3104	ERDS2TJ472		4.7K	1
R3105	ERDS2TJ332		3.3K	1
R4302	ERDS2TJ561		560	1
R6601, 6602	ERD2FCGP121		120	2
			+20%	
R6603	ERDS2TJ223		22K	1
R7003	ERDS2TJ473		47K	1
R7004	ERDS2TJ223		22K	1
R7006	ERDS2TJ473		47K	1
R7007	ERDS2TJ561		560	1
R7012	ERDS2TJ562		5.6K	1
R7013, 7014	ERDS2TJ104		100K	2
R7015	ERDS2TJ333		33K	1
R7016	ERDS2TJ562		5.6K	1
R7018	ERDS2TJ104		100K	1
R7019	ERDS2TJ123		12K	1
R7020	ERDS2TJ563		56K	1
R7021	ERDS2TJ224		220K	1
R7022	ERDS2TJ822		8.2K	1
R7023	AVNE4AA0B4720	Variable	4.7K	1
	EVNE4AA00B53	Variable	5K	1
R7024	ERDS2TJ472		4.7K	1
R7025	EROS2TKG4702	Precision Metal Film	47K	1
			+2%	
R7026	EROS2TKG5602	Precision Metal Film	56K	1
			+2%	
R7027	ERDS1FJ820	1/2W	82	1
R7028	ERDS2TJ222		2.2K	1
R7029	ERDS2TJ333		33K	1
R7030	ERDS2TJ104		100K	1
R7031	ERDS2TJ333		33K	1
R7032	ERDS2TJ104		100K	1
R7033	ERDS2TJ222		2.2K	1
R7034	ERDS2TJ154		150K	1
R7035	ERDS2TJ474		470K	1
R7036	ERDS2TJ331		330	1
R7037	ERDS2TJ472		4.7K	1
R7038, 7039	ERDS2TJ562		5.6K	2
R7042	ERDS2TJ103		10K	1
R7043	ERDS2TJ153		15K	1
R7044	ERDS2TJ103		10K	1
R7045	ERDS2TJ105		1M	1
R7046	ERDS2TJ562		5.6K	1
R7047, 7048	ERDS2TJ103		10K	2
R7049	ERDS2TJ273		27K	1
R7050	ERDS2TJ223		22K	1
R7051	ERDS2TJ224		220K	1

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R7052	ERDS2TJ154	150K	1	
R7053	ERDS2TJ224	220K	1	
R7055	ERDS1FJ1R0	1/2W	1	
R8001	ERDS2TJ472	4.7K	1	
R8002	ERDS2TJ102	1K	1	
R8003	ERDS2TJ183	18K	1	
R8004	ERDS2TJ333	33K	1	
R8005	ERDS2TJ821	820	1	
R8006	ERDS2TJ560	56	1	
R8007	ERDS2TJ471	470	1	
R8008	ERDS2TJ822	8.2K	1	
R8009,8010	ERDS2TJ391	390	2	
R8011,8012	ERDS2TJ182	1.8K	2	
R8013	ERDS2TJ271	270	1	
R8014	ERDS2TJ682	6.8K	1	
R8015	ERDS2TJ273	27K	1	
R8016	ERDS2TJ562	5.6K	1	
R8017	ERDS2TJ273	27K	1	
R8018	EVNE4AA00B24	Variable	20K	1
R8019	ERDS2TJ392	3.9K	1	
R8020	ERDS2TJ682	6.8K	1	
R8021	ERDS2TJ103	10K	1	
R8022	ERDS2TJ274	270K	1	
R8023	ERDS2TJ102	1K	1	
R8024,8025	ERDS2TJ122	1.2K	2	
R8026	ERDS2TJ222	2.2K	1	
R8027	ERDS2TJ822	8.2K	1	
R8028	ERDS2TJ681	680	1	
R8029	ERDS2TJ123	12K	1	
R8030	ERDS2TJ272	2.7K	1	
R8031	ERDS2TJ222	2.2K	1	
R8032	EVNE4AA00B23	Variable	2K	1
R8033,8034	ERDS2TJ102	1K	2	
R8035	ERDS2TJ333	33K	1	
R8036,8037	ERDS2TJ103	10K	2	
R8038	ERDS2TJ333	33K	1	
R8039	ERDS2TJ223	22K	1	
R8040	ERDS2TJ102	1K	1	
R8042	ERDS2TJ102	1K	1	
R8043	ERDS2TJ333	33K	1	
R8044	ERDS2TJ391	390	1	
R8045	ERDS2TJ181	180	1	
R8046	ERDS2TJ103	10K	1	
R8047	ERDS2TJ153	15K	1	
R8048,8049	ERDS2TJ272	2.7K	2	
R8050	ERDS2TJ561	560	1	
R8051	ERDS2TJ274	270K	1	
R8052	ERDS2TJ393	39K	1	
R8053	ERDS2TJ122	1.2K	1	
R8054	ERDS2TJ123	12K	1	
R8055	ERDS2TJ221	220	1	
R8056	ERDS2TJ151	150	1	
R8057,8058	ERDS2TJ100	10	2	
R8059	ERDS2TJ103	10K	1	
		Capacitors		
C1001	ECEB1EU103	Electrolytic 25V 10000	1	
C1002	ECEA50ZR47	Electrolytic 50V 0.47	1	
C1003	ECKW1H101KB5	Ceramic 50V 100P	1	
C1004	ECEA1CS471	Electrolytic 16V 470	1	
C1005	ECEA1HS010	Electrolytic 50V 1	1	
C1006	ECEA1EG221S	Electrolytic 25V 220	1	
C1007	ECEA1ES100	Electrolytic 25V 10	1	
C1008	ECKW1H222KB5	Ceramic 50V 0.0022	1	
C1009	ECEA1HG010S or KM50VB-1M	Electrolytic 50V 1	1	
C1010	VCYW1E104KX	Ceramic 25V 0.1	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C1011	ECEA1HG100S or KM16VB-10M	Electrolytic 50V 10	1	
C1012	ECKW1H472ZF5	Ceramic 50V 0.0047	1	
		+80% -20%		
C1013	ECEA0JF102X or SXC10VB-1000	Electrolytic 6.3V 1000	1	
		Electrolytic 10V 1000	1	
C1014	ECEA1JS330	Electrolytic 63V 33	1	
C1015	ECEA0JS102	Electrolytic 6.3V 1000	1	
C1016	ECKW1H472ZF5	Ceramic 50V 0.0047	1	
		+80% -20%		
C1017	ECEA1HG470S or KM50VB-47M	Electrolytic 50V 47	1	
C1018	ECEA1HS470	Electrolytic 50V 47	1	
C3001	ECEA0JS101	Electrolytic 6.3V 100	1	
C3002	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3003	ECEA1HS010	Electrolytic 50V 1	1	
C3004	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C3005	VCYW1C104MX	Ceramic 16V 0.1	1	
		+20%		
C3006	VCYST50271KB	Ceramic 50V 270P	1	
C3008	VCYST50121JB	Ceramic 50V 120P	1	
		+5%		
C3009	VCYST16103NY	Ceramic 16V 0.01	1	
		+30%		
C3010	ECQV05334JZ	Polyester 50V 0.33	1	
		+5%		
C3011	ECEA0JS470	Electrolytic 6.3V 47	1	
C3012	ECEA1HS2R2	Electrolytic 50V 2.2	1	
C3013	VCYST16103NY	Ceramic 16V 0.01	1	
		+30%		
C3014	VCYST50121JB	Ceramic 50V 120P	1	
		+5%		
C3015	ECEA0JS470	Electrolytic 6.3V 47	1	
C3016	VCYST50390JR	Ceramic 50V 39P	1	
		+5%		
C3017	VCYST16103NY	Ceramic 16V 0.01	1	
		+30%		
C3018	VCYD1C104MX	Ceramic 16V 0.1	1	
		+20%		
C3019,3020	ECEA0JS470	Electrolytic 6.3V 47	2	
C3021,3022	ECEA1HS010	Electrolytic 50V 1	2	
C3023	ECKW1H122KB5	Ceramic 50V 0.0012	1	
C3024	ECEA1HN010	Electrolytic 50V 1	1	
C3025,3026	ECCW1H150JC5	Ceramic 50V 15P	2	
	or ECCW1H150KC5			
		+5%		
C3027	ECCW1H561J5	Ceramic 50V 560P	1	
	or VCKW1H561JSA			
		+5%		
C3028	ECCW1H561J5	Ceramic 50V 560P	1	
	or VCKW1H561JSA			
		+5%		
C3029	ECEA0JS470	Electrolytic 6.3V 47	1	
C3030	ECCW1H391JC5	Ceramic 50V 390P	1	
	or ECCW1H391KC5			
		+5%		
C3031	ECCW1H820JC5	Ceramic 50V 82P	1	
	or ECCW1H820KC5			
		+5%		
C3032	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3033	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3034	ECCW1H470JC5	Ceramic 50V 47P	1	
		+5%		
C3035	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C3036	ECEA0JS470	Electrolytic 6.3V 47	1	

Ref. No.	Part No.	Part Name & Description			Pcs / Set	Remarks
C3037	ECKWH561KB5	Ceramic	50V	560P	1	
C3038, 3039	ECCWH150JC5	Ceramic	50V	15P	2	
	or			+5%		
	ECCWH150KC5					
C3043	ECKWH103ZF5	Ceramic	50	0.01	1	
			+80%	-20%		
C3044	ECEA1CS470	Electrolytic	16V	47	1	
C3052	ECEA0JS471	Electrolytic	6.3V	470	1	
C3053	ECEA1CS471	Electrolytic	16V	470	1	
C3057	ECEA0JS221	Electrolytic	6.3V	220	1	
C3058	ECEA1ES4R7	Electrolytic	25V	4.7	1	
C3059	ECKWH122KB5	Ceramic	50V	0.0012	1	
C3060	ECEA1CS100	Electrolytic	16V	10	1	
C3061	ECKWH101KB5	Ceramic	50V	100P	1	
C3062, 3063	VCYW1C104MX	Ceramic	16V	0.1	2	
				+20%		
C3064	ECCWH121JC5	Ceramic	50V	120P	1	
	or			+5%		
	ECCWH121KC5					
C3065	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C3066	ECKWH101KB5	Ceramic	50V	100P	1	
C3067	VCYW1H473KX	Ceramic	50V	0.047	1	
				+20%		
C3068	ECKWH222ZF5	Ceramic	50V	0.0022	1	
			+80%	-20%		
C3069	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C3070	ECCWH120JC5	Ceramic	50V	12P	1	
	or			+5%		
	ECCWH120KC5					
C3071	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C3072	ECCWH390JC5	Ceramic	50V	39P	1	
	or			+5%		
	ECCWH390KC5					
C3073	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C3074	ECCWH470JC5	Ceramic	50V	47P	1	
				+5%		
C3075	VCYST50151JB	Ceramic	50V	150P	1	
				+5%		
C3076	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C3077	ECCWH151JC5	Ceramic	50V	150P	1	
	or			+5%		
	ECCWH151KC5					
C6601	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C7001	ECEA50ZK15	Electrolytic	50V	0.15	1	
C7002	ECEA1CS470	Electrolytic	16V	47	1	
C7003	ECQMH473KV or	Polyester	50V	0.047	1	
	ECQMH473KZ					
C7005	ECKWH101KB	Ceramic	50V	100P	1	
C7006	ECEA1EN4R7S	Electrolytic	25V	4.7	1	
C7007	ECEA1ES4R7	Electrolytic	25V	4.7	1	
C7008	ECEA1ES220	Electrolytic	25V	22	1	
C7009	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C7010	ECQMH103KV or	Polyester	50V	0.01	1	
	ECQMH103KZ					
C7011	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C7012	ECQMH103KV or	Polyester	50V	0.01	1	
	ECQMH103KZ					
C7013	ECEA1ES3R3	Electrolytic	25V	3.3	1	
C7014	ECEA1CS471	Electrolytic	16V	470	1	
C7015	ECEA0JS102	Electrolytic	6.3V	1000	1	
C7016	ECEA1HS010	Electrolytic	50V	1	1	
C7019	ECQMH103KV or	Polyester	50V	0.01	1	

Ref. No.	Part No.	Part Name & Description			Pcs / Set	Remarks
	ECQMH103KZ					
C7021	ECEA1ES4R7	Electrolytic	25V	4.7	1	
C7023	ECEA1HN2R2	Electrolytic	50V	2.2	1	
C7024	ECEA1CS101	Electrolytic	16V	100	1	
C7025	ECEA1ES3R3	Electrolytic	25V	3.3	1	
C7026	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C7029	ECEA1HSR47	Electrolytic	50V	0.47	1	
C7030	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8001	VCYST16103NY	Ceramic	16V	0.01	1	
				+30%		
C8002	ECEA1ES4R7	Electrolytic	25V	4.7	1	
C8003	VCYST16103NY	Ceramic	16V	0.01	1	
				+30%		
C8004	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8005	ECEA1ES3R3	Electrolytic	25V	3.3	1	
C8006	VCYST16103NY	Ceramic	16V	0.01	1	
				+30%		
C8007, 8008	ECKWH103ZF5	Ceramic	50V	0.01	2	
			+80%	-20%		
C8009	ECQV05474JZ	Ceramic	16V	0.1	1	
				+20%		
C8010, 8011	ECKWH103ZF5	Ceramic	50V	0.01	2	
			+80%	-20%		
C8012	ECKWH222ZF5	Ceramic	50V	0.0022	1	
			+80%	-20%		
C8013	VCYW1C104MX	Ceramic	16V	0.1	1	
				+20%		
C8014	VCYW1E103KX	Ceramic	25V	0.01	1	
C8015	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8016	ECKWH221KB5	Ceramic	50V	220P	1	
				+5%		
C8017	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8018	ECCWH680JC5	Ceramic	50V	68P	1	
				+5%		
C8019	ECCWH820JC5	Ceramic	50V	82P	1	
				+5%		
C8020	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8022	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8023	ECCWH680JC5	Ceramic	50V	68P	1	
	or			+5%		
	ECCWH680KC5					
C8024, 8025	ECKWH472ZF5	Ceramic	50V	0.0047	2	
			+80%	-20%		
C8026	ECEA1CS100	Electrolytic	16V	10	1	
C8027	VCYW1C104MX	Ceramic	16V	0.1	1	
				+20%		
C8028	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8029	ECCWH270JC5	Ceramic	50V	27P	1	
	or			+5%		
	ECCWH270KC5					
C8030	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8031	ECEA1HS010	Electrolytic	50V	1	1	
C8032	ECEA0JS470	Electrolytic	6.3V	47	1	
C8033	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8034	ECCWH121JC5	Ceramic	50V	120P	1	
				+5%		
C8035	ECKWH103ZF5	Ceramic	50V	0.01	1	
			+80%	-20%		
C8036	ECCWH050CC5	Ceramic	50V	5P	1	
				+0.25P		

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C8037	ECKW1H102KB5	Ceramic 50V 0.001	1	
C8038	ECRHA020D11 or	Trimmer 20P	1	
	MCV03R200ER			
C8039	ECEAOJS221	Electrolytic 6.3V 220	1	
C8040	ECKW1H102KB5	Ceramic 50V 0.001	1	
C8042	ECEAOJS221	Electrolytic 6.3V 220	1	
C8043	ECCW1H121JC5	Ceramic 50V 120P	1	
		+5%		
C8044	ECEAIES4R7	Electrolytic 25V 4.7	1	
C8045	ECCW1H820JC5	Ceramic 50V 82P	1	
		+5%		
C8046	VCYW1C153MX	Ceramic 16V 0.015	1	
		+20%		
C8047	ECCW1H680JC5	Ceramic 50V 68P	1	
		+5%		
C8049	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C8051	ECCW1H220KC5 or	50V 22P	1	
	ECCW1H220JC5	50V 22P		
		+5%		
C8052	VCYW1C104MX	Ceramic 16V 0.1	1	
		+20%		
C8053	ECEAOJS221	Electrolytic 6.3V 220	1	
C8054, 8055	ECKF1H103ZF5	Ceramic 50V 0.01	2	
		+80% -20%		
		C/R Complex Components		
CR3002	EXRP102K334	50V 0.001	1	
		1/8W 330K		
CR3003	EXRP122K122	50V 0.0012	1	
		1/8W 1.2K		
		Delay Line		
DL8001	VLD0041		1	
		Filters		
FL3001	ELB5G014 or		1	
	VLF50003			
FL8001	ELB5F023 or		1	
	VLF0104			
FL8002	ELB5E019 or		1	
	VLF0105A			
		Coils		
L1001, 1002	VLQS9H101K	100	2	
L1003	VLQS05R101K or	100	1	
	VLQS66R101K			
L1004	VLQS9H101K	100	1	
L1005, 1006	VLQS05R220K	22	2	
L3002, 3003	VLQS66R820K	82	2	
L3004	VLQS66R101K	100	1	
L3005	VLQS66R151K	150	1	
L3006	VLQS66R101K	100	1	
L3007	VLQS66R680K	68	1	
L3008	VLQS05F4R7K	4.7	1	
L7001	VLQSW01101K	100	1	
L7002	VLQS66R470K	47	1	
L8001	VLQS66R471K	470	1	
L8002	VLQS66R331K	330	1	
L8004, 8005	VLQS66R181K	180	2	
L8006	VLQS66R4R7K	4.7	1	
L8008	VLQS66R101K	100	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
L8009	VLQS66R221K		220	1
L8011	VLQS05F4R7K		4.7	1
		Crystal		
X8001	VSX0060			1
		Transformer		
T1002	ETS19K3A			1
		Miscellaneous		
	TMM5439	Clamper		1
	TMM7464	Clamper		1
	VSCS0266	Shield Case		1
	VSCS0267	Shield Case		1
	VSCS0268	Shield Case		1
	VEKS1362	Lug Ass'y		1
		SERVO & SYSTEM CONTROL C.B.A.		
		Integrated Circuits		
IC2001	AN6359			1
IC2002	MN6168VIB			1
IC2003	AN90C21			1
IC2004	AN6356N			1
IC2005	VCRS0020			1
IC2006	AN6387			1
IC2007	AN1358 or			1
	AN6562 or			
	μPC358C			
IC6001	M54543L			1
IC6002	MN15841VKQ			1
IC6003	MN1405VDG			1
IC6004	TA7267P			1
IC6005	UPD4042C			1
		Transistors		
Q2001	2SB641 (Q, R, S)			1
Q2002	2SD636 (Q, R, S)			1
Q2003	2SB641 (Q, R, S)			1
Q2004-2011	2SD636 (Q, R, S)			8
Q2012	2SB641 (Q, R, S)			1
Q2013	2SD636 (Q, R, S)			1
Q2014	2SB641 (Q, R, S)			1
Q6001-6004	2SD637 (Q, R, S)			4
Q6005-6009	2SD636 (Q, R, S)			5
Q6010	2SB641 (Q, R, S)			1
Q6011	2SD638 (Q, R, S)			1
Q6012	2SD636 (Q, R, S)			1
Q6013-6015	2SB641 (Q, R, S)			3
Q6016, 6017	2SD636 (Q, R, S)			2
Q6019	2SD636 (Q, R, S)			1
Q6020, 6021	2SA950Y or			2
	2SB643 (R, S)			
Q6022-6024	2SD636 (Q, R, S)			3
Q6028	2SD636 (Q, R, S)			1
Q6029-6033	2SB641 (Q, R, S)			5

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Diodes		
D2001-2006	MA165 or 1SS119		6	
D2008-2010	MA165 or 1SS119		3	
D2013, 2014	MA165 or 1SS119		2	
D2015	MA165 or 1SS119		1	
D6002, 6003	MA166		2	
D6004, 6005	MA166		2	
D6006, 6007	MA165 or 1SS119		2	
D6008, 6009	MA166		2	
D6010-6013	MA165 or 1SS119		4	
D6015-6019	MA165 or 1SS119		5	
D6020	MA27WA		1	
D6022	MA165 or 1SS119		1	
D6024-6026	MA165 or 1SS119		3	
D6028, 6029	MA165 or 1SS119		2	
D6030	MA166		1	
D6031, 6032	MA165 or 1SS119		2	
D6033, 6034	MA4047	Zener	2	
D6037, 6038	MA165 or 1SS119		2	
D6039-6047	MA166		9	
D6053	MA166		1	
D6054-6062	MA165 or 1SS119		9	
D6063	MA165 or 1SS119		1	
D6064	MA165 or 1SS119		1	
D6065	MA166		1	
D6066, 6067	MA165 or 1SS119		2	
D6068, 6069	MA166		2	
D6070, 6071	MA165 or 1SS119		2	
D6201-6204	MA165 or 1SS119		4	
		Resistors		
R2001	ERDS2TJ223	22K	1	
R2002	EVJFFAF20B15	Variable	100K	1
R2003	ERDS2TJ224	220K	1	
R2004	ERDS2TJ124	120K	1	
R2005	ERDS2TJ102	1K	1	
R2006	ERDS2TJ152	1.5K	1	
R2007	ERDS2TJ333	33K	1	
R2008	ERDS2TJ222	2.2K	1	
R2009	ERDS2TJ124	120K	1	
R2010	ERDS2TJ333	33K	1	
R2011	ERDS2TJ104	100K	1	
R2012, 2013	EROS2TKG4701	Precision Metal Film	4.7K	2
R2014	ERDS2TJ154	150K	1	
R2015, 2016	ERDS2TJ104	100K	2	
R2017	ERDS2TJ563	56K	1	
R2018	ERDS2TJ274	270K	1	
R2019, 2020	ERDS2TJ104	100K	2	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R2021	ERDS2TJ474	470K	1	
R2022	ERDS2TJ562	5.6K	1	
R2023	ERDS2TJ103	10K	1	
R2024	ERDS2TJ104	100K	1	
R2025	ERDS2TJ333	33K	1	
R2026	ERDS2TJ102	1K	1	
R2027	ERDS2TJ223	22K	1	
R2028	EVN38CA00B54	Variable	50K	1
R2029	EVN38CA00B15	Variable	100K	1
R2030	ERDS2TJ104	100K	1	
R2032	ERDS2TJ472	4.7K	1	
R2033, 2034	ERDS2TJ332	3.3K	2	
R2035	ERDS2TJ181	180	1	
R2036	ERDS2TJ222	2.2K	1	
R2037	ERDS2TJ104	100K	1	
R2038	ERDS1FJ1R5	1/2W 1.5	1	
R2039	ERDS2TJ103	10K	1	
R2040	ERGLANJ150	Metal Oxide 1W	15	1
R2041	ERDS2TJ470	47	1	
R2042	ERX12ANJR56	Metal Oxide 1/2W	0.56	1
R2043, 2044	ERDS2TJ470	47	2	
R2045	EROS2TKG1801	Precision Metal Film	1.8K	1
R2046	EROS2TKG6801	Precision Metal Film	6.8K	1
R2047	ERDS2TJ124	120K	1	
R2050	ERDS2TJ333	33K	1	
R2051	ERDS2TJ682	6.8K	1	
R2052	ERDS2TJ562	5.6K	1	
R2053	ERDS2TJ104	100K	1	
R2054	ERDS2TJ103	10K	1	
R2055	ERDS2TJ473	47K	1	
R2056	ERDS2TJ104	100K	1	
R2057	ERDS2TJ333	33K	1	
R2058	ERDS2TJ562	5.6K	1	
R2061-2066	ERDS2TJ563	56K	6	
R2067	ERDS2TJ104	100K	1	
R2068	ERDS2TJ103	10K	1	
R2069, 2070	ERDS2TJ104	100K	2	
R2071, 2072	ERDS2TJ682	6.8K	2	
R2073	ERDS2TJ333	33K	1	
R2074	ERDS2TJ102	1K	1	
R2075	ERDS2TJ150	15	1	
R2079	ERDS2TJ104	100K	1	
R2080	ERDS2TJ473	47K	1	
R3095	EVJFFAF20B52	Variable	500	1
R6001	ERDS2TJ103	10K	1	
R6002	ERDS2TJ102	1K	1	
R6003	ERDS2TJ223	22K	1	
R6004, 6005	ERDS2TJ472	4.7K	2	
R6006	ERDS2TJ102	1K	1	
R6007	ERDS2TJ392	3.9K	1	
R6008	ERDS2TJ223	22K	1	
R6012-6026	ERDS2TJ473	47K	15	
R6027	ERDS2TJ222	2.2K	1	
R6028	ERDS2TJ333	33K	1	
R6029, 6030	ERDS2TJ332	3.3K	2	
R6031	ERDS2TJ102	1K	1	
R6032	ERDS2TJ103	10K	1	
R6033	ERDS2TJ153	15K	1	
R6034	ERDS2TJ103	10K	1	
R6036	ERDS2TJ103	10K	1	
R6037	ERDS2TJ152	1.5K	1	
R6038-6040	ERDS2TJ332	3.3K	3	
R6041	ERDS2TJ102	1K	1	
R6042	ERDS2TJ471	470	1	
R6043	ERDS2TJ222	2.2K	1	
R6044, 6045	ERDS2TJ472	4.7K	2	
R6046	ERDS2TJ274	270K	1	
R6047, 6048	ERDS2TJ223	22K	2	
R6049	ERDS2TJ474	470K	1	
R6050	ERDS2TJ333	33K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6051	ERDS2TJ102		1K 1	
R6052	ERDS2TJ274		270K 1	
R6053, 6054	ERDS2TJ223		22K 2	
R6055, 6056	ERDS2TJ103		10K 2	
R6057	ERDS2TJ472		4.7K 1	
R6058	ERDS2TJ103		10K 1	
R6059	ERDS2TJ563		56K 1	
R6060, 6061	ERDS2TJ683		68K 2	
R6062	ERDS2TJ103		10K 1	
R6063, 6064	ERDS2TJ472		4.7K 2	
R6065	ERDS2TJ683		68K 1	
R6066, 6067	ERDS2TJ472		4.7K 2	
R6068	ERDS2TJ334		330K 1	
R6069	ERDS2TJ152		1.5K 1	
R6071	ERDS2TJ152		1.5K 1	
R6072	ERDS2TJ682		6.8K 1	
R6073	ERDS2TJ181		180 1	
R6074, 6075	ERDS2TJ472		4.7K 2	
R6076	ERDS2TJ563		56K 1	
R6077	ERDS2TJ333		33K 1	
R6078	EVNE4AAB0053	Variable	5K 1	
R6079-6082	ERDS2TJ682		6.8K 4	
R6083-6086	ERDS2TJ472		4.7K 4	
R6087-6089	ERDS2TJ103		10K 3	
R6090	ERDS2TJ274		270K 1	
R6091	ERDS1TJ910	Metal Oxide 1/2W	91 1	
R6092	ERDS2TJ332		3.3K 1	
R6093	ERDS2TJ223		22K 1	
R6094	ERDS2TJ473		47K 1	
R6095	ERDS2TJ223		22K 1	
R6096, 6097	ERDS2TJ224		220K 2	
R6098	ERDS2TJ223		22K 1	
R6099	ERDS2TJ153		15K 1	
R6100-6103	ERDS2TJ333		33K 4	
R6104	ERDS2TJ682		6.8K 1	
R6105, 6106	ERDS2TJ333		33K 2	
R6107	ERDS2TJ103		10K 1	
R6108	ERDS2TJ272		2.7K 1	
R6110	ERDS2TJ272		2.7K 1	
R6111-6114	ERDS2TJ103		10K 4	
R6115	ERDS2TJ272		2.7K 1	
R6116	ERDS2TJ103		10K 1	
R6117	ERDS2TJ223		22K 1	
R6118	ERDS2TJ472		4.7K 1	
R6119	ERDS2TJ223		22K 1	
R6120	ERDS2TJ103		10K 1	
R6121	ERDS2TJ223		22K 1	
R6122	ERDS2TJ220		22 1	
R6123	ERDS1FJ6R8	Metal Oxide 1/2W	6.8 1	
R6125	ERDS2TJ392		3.9K 1	
R6127	ERDS2TJ105		2.7K 1	
R6129, 6130	ERDS2TJ473		47K 2	
R6134	ERDS2TJ223		22K 1	
R6135, 6136	ERDS2TJ472		4.7K 2	
R6137	ERDS2TJ103		10K 1	
R6138	ERDS2TJ223		22K 1	
R6139	ERDS2TJ472		4.7K 1	
R6149	ERDS2TJ104		100K 1	
R6150	ERDS2TJ393		39K 1	
R6151, 6152	ERDS2TJ104		100K 2	
R6153	ERDS2TJ103		10K 1	
R6154	ERDS2TJ823		82K 1	
R6155	ERDS2TJ223		22K 1	
R6156	ERDS2TJ472		4.7K 1	
R6157	ERDS2TJ223		22K 1	
R6158	ERDS2TJ823		82K 1	
R6159-6162	ERDS2TJ272		2.7K 4	
R6163	ERDS2TJ393		39K 1	
R6164	ERDS2TJ473		47K 1	
R6165	ERDS2TJ472		4.7K 1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R6166	ERDS2TJ473		47K 1	
R6167	ERDS2TJ103		10K 1	
R6168	ERDS2TJ153		15K 1	
R6169, 6170	ERDS2TJ102		1K 2	
R6172	ERDS2TJ104		100K 1	
R6201	ERDS2TJ183		18K 1	
R6202-6205	ERDS2TJ104		100K 4	
		Capacitors		
CX5001, 6002	EXFP4471ZW	Complex Component 50V 470P	2	
C2001	ECQMIH563KV or ECQMIH563KZ	Polyester 50V 0.056	1	
C2002	ECEA1HS010	Electrolytic 50V	1 1	
C2003	ECEA1ES4R7	Electrolytic 25V 4.7	1 1	
C2004	ECEA1HN010S	Electrolytic 50V	1 1	
C2005	ECEA0JS101	Electrolytic 6.3V 100	1 1	
C2006	ECQMIH562KV or ECQMIH562KZ	Polyester 50V 0.0056	1	
C2007	VCYW1E104KX	Ceramic 25V 0.1	1 1	
C2008	ECQMIH562KV or ECQMIH562KZ	Polyester 50V 0.0056	1	
C2009	ECKW1H102KB5	Ceramic 50V 0.001	1 1	
C2010	ECQMIH562KV or ECQMIH562KZ	Polyester 50V 0.0056	1	
C2011	VCYW1E104KX	Ceramic 25V 0.1	1 1	
C2012	ECEA0JS470	Electrolytic 6.3V 47	1 1	
C2013	ECQMIH472KV or ECQMIH472KZ	Polyester 50V 0.0047	1	
C2014	ECEA1HS010	Electrolytic 50V	1 1	
C2015	ECEA0JS101	Electrolytic 6.3V 100	1 1	
C2016	ECQMIH223KV or ECQMIH223KZ	Polyester 50V 0.022	1	
C2017	ECQMIH104KV or ECQMIH104KZ	Polyester 50V 0.1	1 1	
C2018	ECQMIH182KV or ECQMIH182KZ	Polyester 50V 0.0018	1	
C2019, 2020	ECEA1CS100	Electrolytic 16V 10	2	
C2021	ECEA0JS470	Electrolytic 6.3V 47	1 1	
C2022	ECQMIH223KV or ECQMIH223KZ	Polyester 50V 0.022	1	
C2023	ECEA0JS470	Electrolytic 6.3V 47	1 1	
C2024	ECEA1HS2R2	Electrolytic 50V 2.2	1 1	
C2025	ECQMIH682KV or ECQMIH682KZ	Polyester 50V 0.0068	1	
C2026	ECEA1ES221	Electrolytic 25V 220	1 1	
C2027	ECEA10Z47	Ceramic 10V 47	1 1	
C2028-2030	ECEA1HN2R2	Electrolytic 25V 2.2	3	
C2031	ECKW1H102KB5	Ceramic 50V 0.001	1 1	
C2032	ECEA1ES3R3	Electrolytic 25V 3.3	1 1	
C2033	ECQMIH123KV or ECQMIH123KZ	Polyester 50V 0.012	1	
C2034	ECEA50Z2R2	Electrolytic 50V 0.22	1 1	
C2035	ECEA0JS470	Electrolytic 6.3V 47	1 1	
C2036	ECEA25Z100	Electrolytic 25V 100	1 1	
C2037	ECQMIH103KV or ECQMIH103KZ	Polyester 50V 0.01	1 1	
C2038	ECEA1CS101	Electrolytic 16V 100	1 1	
C2039	ECEA50Z2R2	Electrolytic 50V 0.22	1 1	
C2041	ECEA16Z10	Electrolytic 16V 10	1 1	
C2043	ECEA1HSR47	Electrolytic 50V 0.47	1 1	
C2044	ECEA1ES4R7	Electrolytic 25V 4.7	1 1	
C2045	ECQV05184JZ	Polyester 50V 0.18	1	
		+5%		
C2046	VCYW1E104KX	Ceramic 25V 0.1	1 1	
C2047	ECQMIH102KV or ECQMIH102KZ	Polyester 50V 0.001	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Coils		
L3501	VLQS66R820K		82 1	
L3502	VLQS66R101K		100 1	
L3503	VLQS66R181K		180 1	
L3504	VLQS66R270K		27 1	
L3505	VLQS66R390K		39 1	
L3506	VLQS66R102K		1mH 1	
L3507	VLQS66R471K		470 1	
L3508	VLQS66R102K		1mH 1	
L3509	VLQS66R471K		470 1	
L3510	VLQS66R101K		100 1	
L3511, 3512	VLQS66R100K		10 2	
L3513	VLQS66R220K		22 1	
L3514	VLQS66R151K		150 1	
L3515	VLQS66R8R2K		8.2 1	
L3516	VLQS66R470K		47 1	
L3517-3519	VLQS66R101K		100 3	
L3520-3523	VLQS66R2R2J		2.2 4	
			+5%	
		Pin Headers		
P3301	VJPS0013		5P 1	
P3502, 3503	VJPS0015		10P 2	
		Miscellaneous		
	VEKS1223	Lug Ass'y	1	
	VSCS0316	Shield Case	1	
	VSCS0317	Shield Case	1	
	VSCS0318	Shield Case	1	
		CHANNEL SELECTOR & POTENTIOMETERS C.B.A.		
		Integrated Circuits		
IC7301	μPC1363CA		1	
		Diodes		
D7301-7314	MA166C		14	
		Resistors		
R7301-7314	EWEM2A401B24	Variable	20K 14	
R7319	ERDS2TJ683		68K 1	
R7320	ERDS2TJ103		10K 1	
		Capacitors		
C7301	ECEALCK100	Electrolytic	16V 10 1	
C7303	ECQMLH223KV or	Polyester	50V 0.022 1	
	ECQMLH223KZ			
C7304	VCYST16103NY	Ceramic	16V 0.01 1	
			+30%	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
C7305, 7306	VCYST25332NX	Ceramic	25V 0.0033 1	
			+30%	
		Switches		
SW7301-7314	EVQ-REAK05	UHF/VHF Band Select SW	14	
SW7315	VSSS0005 or VES0198	AFT SW	1	
		Miscellaneous		
	VGNS0629	Tuning V.R Case Decoration	1	
	VSCS0294	Shield Case	1	
	VMZS0095	Spacer	1	
		OPERATION C.B.A.		
		Diode		
D6501-6514	MA166		14	
		Capacitors		
C6501, 6502	ECKWLH103ZF5	Ceramic	50V 0.01 2	
			+80% -20%	
		Switches		
SW6501-6508	EVQ-QJ104K	Push SW	8	
SW6509-6511	EVQQR05K	Push SW	3	
SW6512	EVQ-QJ104K	Push SW	1	
		Miscellaneous		
	VJF0044	Spacer	2	
	VGMS0037	Timer Display Tube Holder	1	
DP6501	VSZS0012	Display Tube	1	
		CHANNEL SWITCHES C.B.A.		
		Diodes		
D6301-6304	MA166		4	
D7215-7228	MA166		14	
D7229-7242	LN31GCPHLM-U	L.E.D. Green	14	
		Resistor		
R7221	ERDS2TJ273		27K 1	
		Switches		
SW6301-6304	EVQ-QJ104K	Push SW	4	
SW7215-7228	EVQ-QJ104K	Push SW	14	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Transformers		
T701	EIV7F009A		1	
T702	EIV7F009B		1	
		Miscellaneous		
	VEPS0757	TV Demodulator C.B.A.	1	
	VJHS0019	IF Pack Lead Pin	13	
	VSCS0276	Shield Case	1	
	VSCS0277	Shield Case	1	
	VSCS0278	Shield Case	1	
	VSCS0280	Shield Case	1	
		AUDIO C.B.A.		
		Integrated Circuits		
IC4001	AN90C22		1	
IC4002	μPC1513HA		1	
IC4003	μPC1514CA		1	
		Transistors		
Q4001	2SD636 (Q, R, S)		1	
Q4003	2SD637 (Q, R, S)		1	
Q4004-4007	2SD636 (Q, R, S)		4	
		Diode		
D4001-4003	MA165		3	
		Resistors		
R4001	ERDS2TJ470		47	1
R4002	ERDS2TJ331		330	1
R4004	ERDS2TJ101		100	1
R4005	ERDS2TJ223		22K	1
R4006	ERDS2TJ221		220	1
R4007	ERDS2TJ182		1.8K	1
R4008	ERDS2TJ103		10K	1
R4009	ERDS2TJ333		33K	1
R4010	ERDS2TJ182		1.8K	1
R4011	ERDS2TJ223		22K	1
R4012	ERDS2TJ273		27K	1
R4013	ERDS2TJ102		1K	1
R4014	ERDS2TJ820		82	1
R4015	ERDS2TJ223		22K	1
R4016	AVNE4AA00B15	Variable	100K	1
R4019	ERDS2TJ333		33K	1
R4020	AVNE4AA00B53	Variable	5K	1
R4021	ERDS2TJ124		120K	1
R4022	ERDS2TJ101		100	1
R4023	ERDS2TJ220		22	1
R4024	AVNE4AA00B13	Variable	1K	1
R4025	ERDS2TJ103		10K	1
R4026	ERDS2TJ563		56K	1
R4027	ERDS2TJ562		5.6K	1
R4028	ERDS2TJ223		22K	1
R4029	ERDS2TJ333		33K	1
R4030	ERDS2TJ220		22	1
R4031	ERDS2TJ221		220	1
R4032	ERDS2TJ103		10K	1
R4033-4035	ERDS2TJ333		33K	3
R4036	ERDS2TJ223		22K	1
R4037, 4038	ERDS2TJ333		33K	2
R4039	ERDS2TJ102		1K	1

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Capacitors		
C4001	ECEA50ZR47	Electrolytic 50V 0.47	1	
C4002	ECEA50ZR22	Electrolytic 50V 0.22	1	
C4003	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C4004	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C4005	ECEA1CS101	Electrolytic 16V 100	1	
C4006	ECEA50ZR10	Electrolytic 50V 0.1	1	
C4007	ECEA50ZR10	Electrolytic 50V 0.10	1	
C4009	ECEA1CS100	Electrolytic 16V 10	1	
C4010	ECEA1HS010	Electrolytic 50V 1	1	
C4011	ECEA1CS100	Electrolytic 16V 10	1	
C4012	ECEA1ES4R7	Electrolytic 25V 4.7	1	
C4013, 4014	ECEA1HS010	Electrolytic 50V 1	2	
C4015	ECEA1CS100	Electrolytic 16V 10	1	
C4016	ECEA1CS330	Electrolytic 16V 33	1	
C4017	ECCW2H221K2	Ceramic 500V 220P	1	
C4018	ECKW1H103ZF5	Ceramic 50V 0.01	1	
		+80% -20%		
C4019	ECQM4822KZ	Polyester 400V 0.0082	1	
C4020	VCYW1E223KX	Ceramic 25V 0.022	1	
C4021	ECEA1CS470	Electrolytic 16V 47	1	
C4022	VCYW1E103KX	Ceramic 25V 0.01	1	
C4023	ECKW1H102KB5	Ceramic 50V 0.001	1	
C4024	ECEA25MR7S	Electrolytic 25V 4.7	1	
C4025	ECEA1CS330	Electrolytic 16V 33	1	
C4026	ECQV05333JZ	Polyester 50V 0.033	1	
		+5%		
C4027	ECEA50ZR33	Electrolytic 50V 0.33	1	
C4028	VCYW1E103KX	Ceramic 25V 0.01	1	
C4029	ECEA1CS330	Electrolytic 16V 33	1	
C4030, 4031	ECEA1CS100	Electrolytic 16V 10	2	
C4032	ECKW1H102KB5	Ceramic 50V 0.001	1	
C4033	VCYW1E563KX	Ceramic 25V 0.056	1	
C4034	VCYW1C104MX	Ceramic 16V 0.1	1	
		+20%		
C4035	ECKW1H102KB5	Ceramic 50V 0.001	1	
C4036	ECKW1H102KB5	Ceramic 50V 0.001	1	
C4038	ECEA1CS220	Electrolytic 16V 22	1	
C4039	VCYD1C104MX	Ceramic 16V 0.1	1	
		+20%		
		Coils		
L4001	VLQ867F222K		2.2mH	1
L4002	VLQ866F181K		180	1
L4003	VLQ867F222K		2.2mH	1
		Pin Headers		
P4001	VJPS0012		4P	1
P4002	VJPS0022		7P	1
P4003	VJPS0011		3P	1
		Transformer		
T4001	ELM7Q018E			1
		Miscellaneous		
	TMM6985	Clamper		2

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		FUSE C.B.A.		
		Resistor		
R1028	ERCL2ZGK275	Solid 1/2W 2.7M	1	
		+10%		
		Fuses		
F1001	EBA1C10N0100	1A	1	
F1002	XBA1C30N0100	3A	1	
		Miscellaneous		
	TJC6320	Fuse Holder	4	
		MODE SELECT SWITCH C.B.A.		
		Diodes		
D1571-1574	MA165		4	
		Switch		
SW1553	VSSS0009 or VSSS0011	Mode Select SW	1	
		REEL SENSOR C.B.A.		
		Integrated Circuits		
IC1551	PN6838A		1	
		Miscellaneous		
	VJBS00232	Reel Sensor P.C.B.	1	
		ELECTRICAL PARTS		
		LOCATED ON CHASSIS		
	TJE98101	Check Terminal	72	
	TNV56751F2	Tuner	1	
	VEJS0015	ANT Terminal	1	
	VEQS0206	RF Converter	1	
	VEQS0236	RF Converter	1	
	VJAS0032	AC Cord	1	
	VJBS00245	Supply Photo TR P.C.B.	1	
	VJBS00246	Take Up Photo TR P.C.B.	1	
	VJES0004	Check Terminal	4	
	VJJS0047	ANT Terminal Plate	1	
	VLTS0002	Balloon Core	1	
	VMA50783	AC Cord Angle	1	
	XTV3+10B	Tapping Screw 3 x 10	2	
	XYE3+EF8	Screw With Washer 3 x 8	1	
C1557,1558	ECEA1HN010	Capacitor Electrolytic	2	
		50V	1	
D1551,1552	MA161C		2	
P1551	VJPS0050		8P	1
Q1001	2SD1266(P,Q)		1	
Q1551,1552	PN150NV	Photo Transistor	2	
R1551	ERDS2TJ100	Resistor	10	1
SW1551,1552	VSMS0005	Cassette Up, Down SW	2	
SW1554	VSHS0005	Cassette In SW	1	
T1001	VTPS0006A	Power Transformer	1	
	VUJS0010	VIDEO IN JACK	1	
	VUJS0009	AUDIO IN JACK	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		IR WIRELESS RECEIVING		
		DETECTOR UNIT		
		Integrated Circuit		
IC1	μPC1373H		1	
		Diodes		
D1	PH302 or PN313	Pin Diode SI	1	
		Pin Diode SI	1	
		Resistors		
R1	ERDS2TJ102		1K	1
R2	ERDS2TJ560		56	1
R3	ERDS2TJ224		220K	1
		Capacitors		
C1	ECEA1CK100	Electrolytic	16V 10	1
C2	ECEA1EK4R7	Electrolytic	25V 4.7	1
C3	ECEA1CK100	Electrolytic	16V 10	1
C4	AM2V50K183	Polyester	50V 0.018	1
C5	ECEA1CK470	Electrolytic	16V 47	1
C6	APSV100J182	Polyester	100V 0.0018	1
			+5%	
		Transformer		
T1	ELM7Q206A		1	
		IR WIRELESS TRANSMITTER UNIT		
		Integrated Circuits		
IC1	MN6030C		1	
		Transistor		
Q1	2SD1458		1	
		Diodes		
D1	LN66NC	L.E.D. RED	1	
D2,D3	MA154WK	Diode SI	2	
		Resistors		
R1	ERD25TJ182		1.8K	1
R2	ERD25TJ470		47	1
R3	ERD25TJ180		1	1
		Capacitors		
C1,C2	ECKF1H101KB	Ceramic	50V 100PF	1
			+10%	
C3	ECEA0JS101	Electrolytic	6.3V 100	
C4	ECKF1H472KB	Ceramic	50V 0.0047	
		Crystal		
X1	CSB455EB1		1	

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